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A Monthly Review of Veterinary Science.

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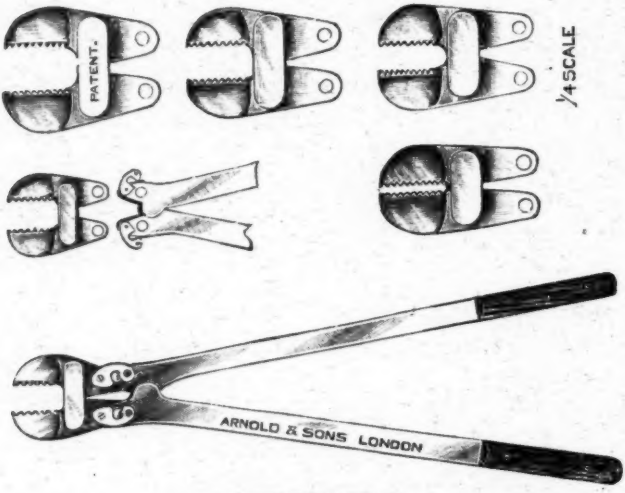

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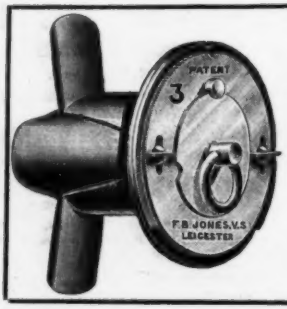

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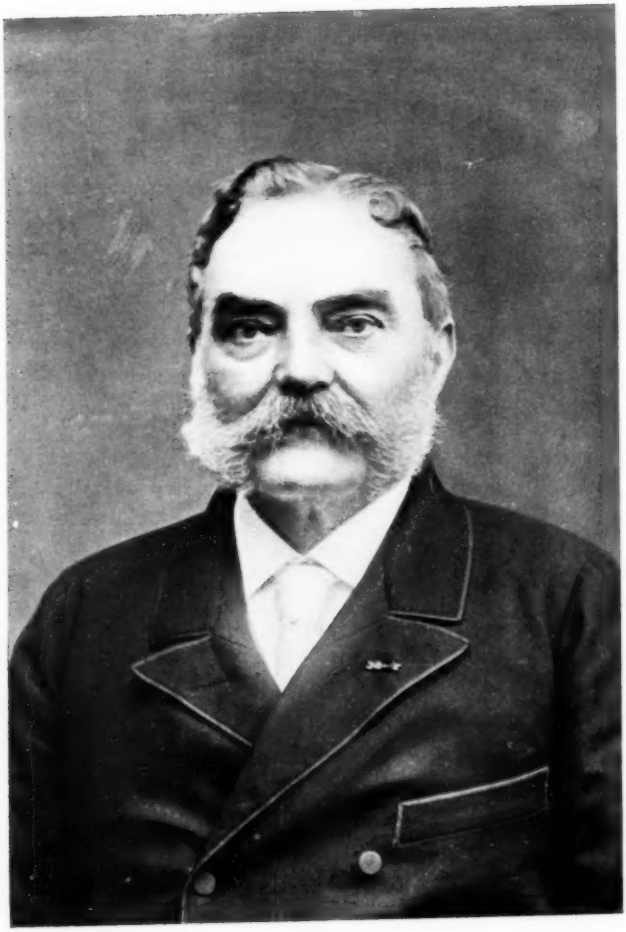

THE

VETERINARY JOURNAL

JANUARY, 1912.

Editorial.

DISTEMPER OF THE DOG.

Indexed B. A. U.

THE distemper question has occupied the minds of veterinary practitioners for many years, and on every hand the cry has gone up for a specific to be discovered. Those who are clinicians have begged again and again for the laboratory scientist to turn his attention to the question, and the despairing dog owner and breeder has echoed the request a thousand times.

At last something is being done, and there seems, indeed, to be reason to think that hopes of everybody in this direction are not going to be shattered. In at least five laboratories, to our personal knowledge, at the present moment, eminent bacteriologists are devoting time and research to the subject, and from clinical observations made with vaccines supplied, we are able to state that the results have been, at least, encouraging.

The account given by Dr. McGowan on pages 7 to 17 of his researches into the symptoms, prophylaxis, and treatment of this disease will be read with interest by every veterinary surgeon who has canine patients in his practice; it is also the precursor of other papers and clinical articles which will appear at later dates.

Dr. McGowan has conducted a most careful inquiry, and freely admits that he has found many difficulties and has by no means as yet reached the desired end. One very great advance, at all events, cannot but have special attention drawn to it—*i.e.*, the unanimity of opinion between this worker and Dr. Ferry, of Detroit, U.S.A., that the organism upon which this latter gentleman published a preliminary report in the *American Veterinary Review*, of July, 1910, and a further and more prolonged report in the *Journal of Infectious Diseases* for June, 1911 (and which he named the *Bacillus bronchicanis*), is the actual cause of the disease. This is a great point gained, for when two bacteriologists of eminence agree upon a subject upon which there has been so much dispute for many years, it gives the clinician a better degree of confidence—and after all, it is the clinician who has got to finally work the subject out and find out the weak points, if such exist.

Distemper may truly be said to be the "curse of dogdom," the greatest canine scourge we have. It is *the* most contagious of all the diseases to which the dog and cat are liable, and its ravages cause the loss literally of tens of thousands of pounds annually to dog owners and breeders, apart from any sentimental value which cannot be estimated in money.

As proof of this we can look back on grants of money for research into the question given by the Masters of Foxhounds' Association and other prominent bodies; and at the present moment a committee has been formed by the Kennel Club Council of Representatives in order to examine witnesses (especially do they ask the veterinary profession to help) as to "what improvements can be made in the procedure at present followed at dog shows to obviate healthy dogs becoming infected; and, further, whether any useful steps can be taken to minimize the spread of distemper by making generally known to exhibitors what precautions they should adopt to avoid sending to shows dogs which, although not necessarily showing symptoms of distemper, may (in the absence of precautions) be capable of conveying the disease to other dogs."

The inquiry will undoubtedly be useful in spreading knowledge upon the prophylaxis of the disease, and it is to be hoped that the results attained will be of substantial benefit.

General Articles.

SOME MEMBERS OF THE ROYAL COLLEGE OF VETERINARY SURGEONS WHO HAVE ACHIEVED NATIONAL DISTINCTION IN COMPARATIVE MEDICINE IN THE UNITED STATES OF AMERICA.

By Dr. ARTHUR HUGHES, Litt.M., Ph.D. (Cornell University), D.V.M. (New York State Veterinary College),

Continued from page 708, December, 1911.)

Alexandre François Liautard, M.D., V.M., (Hon.) F.R.C.V.S.

There are two excellent reasons for introducing the name of Professor Liautard into this series of sketches. The first is, though he did not take examinations for membership in the Royal College, he, nevertheless, has membership, by receiving at the early age of 25 years the Honorary Fellowship. The second is, that he is, above all men, to be honoured as the father of the veterinary profession in the United States of America.

Born in Paris, France, February 15, 1835, Liautard was graduated from the National Veterinary School at Alfort, 1856, following which he served three years in the French Army. The year 1860 was a memorable one for him; for in that year he received the Honorary Fellowship in the Royal College of Veterinary Surgeons and came to New York City as a private practitioner. For the next four years he so practised, and meanwhile studied for the degree of Doctor of Medicine, which was conferred by the University of the City of New York, in 1864. The same year he was appointed Professor of Anatomy and Operative Surgery, and Director of the Hospital in the New York College of Veterinary Surgeons. This was at a time when there had been no such thing as a veterinary college nor a veterinary profession in the United States. He nursed the institution and remained there until 1875, when its activities were merged into the American Veterinary College, which was that year incorporated and organized. The American Veterinary College (New York City) was the cradle of the American

veterinary profession. Dr. Liautard remained at that College from 1875 to 1898 as Director, Dean of the Faculty, and Professor of Anatomy, Operative Surgery, Sanitary Medicine and Jurisprudence. In other words, his was the guiding hand and brain of the two colleges; the one from 1864-1875; the other from 1875-1898—the long period of thirty-five years—and in this college work, though beset by many drawbacks, he was abundantly successful. A zealot, an inspirer of men, he provided buildings to carry on the work of the colleges and furnished clinical material for demonstration and operative purposes. His name is held in reverence, even in awe, by students who come in contact with him during the long period of his American residence.

His collegiate teaching was only part of his work. He was the founder, not only of the first veterinary college in America, but also one of the organizers of what is to-day the American Veterinary Medical Association, and the founder of a veterinary journal which aimed to serve the interests of the American branch of the veterinary profession, the *American Veterinary Review*. He was one of the organizers of the United States Veterinary Medical Association, the precursor of the American Veterinary Medical Association. He was the first secretary of the organization and twice president—1875-1877 and 1886-1887. No man since has equalled this record; three years the presiding officer of the national body.

Dr. Liautard has always been a prolific writer on veterinary topics. He took the editorship of the *American Veterinary Review* in 1877, and holds it to-day. He has poured into it, all these years, a continued stream of translations, special articles, and editorials, and the "European Chronicles" of that Journal, written by him, are eagerly read. He has written books on surgery, animal castration, rabies, diseases of the foot, age, lameness, some of which have gone through a dozen editions. He is the Nestor of American veterinary literature. So alert is his mind, and so keen his journalistic instinct, that he watches the drift of veterinary thought in two continents that he may give impetus to it in the columns of his journal. He is the grand old man of veterinary journalism in America.

Two continents have honoured him for his enterprise and labours for the profession. He has always been an organizer

of associations, local as well as national. He has been chosen an active or honorary member of many local veterinary associations in the United States and in Europe. In this regard his reputation is secure, not only in America, but in England, France, and Belgium. The Royal College made him an Honorary Fellow. He was elected Honorary member of the Academy of Medicine of Brussels. A short time ago he was President of the Société Centrale de Médecine Vétérinaire of Paris, where he has resided for the last few years. He received, in France, the decoration of Chevalier of the Mérite Agricole, and officer of the same Order in 1904. Finally, in 1909, he received the decoration of the Légion d'Honneur.

Who can read a sketch of the life of Liautard, be it ever so imperfect, without receiving an inspiration? The ardour of the man, his persistency, his ambition, merits all the honour and all the praise which has been given him.

There is a human note in biographical sketches of scientific men, which must vibrate with the feelings of readers of scientific journals. The time and energies of this class of men are so given over to technical topics and pursuits that publishers are prone to forget that these men are men—persons whose lives run the whole gamut of emotions, and who, having won honour and renown, and acquired a reputation for sterling worth, in all modesty appreciate the pleasure other men take in reading of their successes. Of veterinarians this must be intensely true; for their pathway to pre-eminence in veterinary science is not an easy one to travel. There are many advantages in biographic study. Of all forms of historical record, biography is the best. *A fortiori* veterinary biography is the best form of record of success in science or its application. Some of the advantages of scientific biography are: The recognition given to the earnest, successful work of the subject; the record made in presentable, literary form of his life and work; the inspiration and encouragement it gives to readers; the ambition it begets and the furtherance of the science thus accomplished by its aid. But scientific biography also has its drawbacks and its limitations, and its pitfalls. It is seldom that there are episodes in the lives of scientists, at least in the lives of veteri-

narians, that are dramatic; yet biographic writing in general tends to play freely with the dramatic phases of men's lives. The aims of the scientists are not to make a great noise in the world; nor to call attention to themselves like a display of fireworks. They, if they are veterinarians, desire to add new facts to the science; to apply old facts more patently; to engender sound scientific principles; to raise educational standards so that scientific facts known may be better understood, appreciated, and applied for public advantage. The recording of the lives of men whose fealty to these things amounts to devotion, constitutes, therefore, a new form of biography. Whether that be true or not, certainly veterinary biography has had few exponents. Perhaps the work of writing veterinary biography has been awaiting a worker. Buried away in obscure corners of certain dry-as-dust books in England and America one may find sapless records of the work of some prominent veterinarians. If veterinarians in the English-speaking world can read a palpitating, breathing record of the lives of some of their celebrated contemporaries, that would be inviting and would be a net gain to veterinary journalism. To produce such a record of the lives of Royal College men who have achieved national distinction in veterinary medicine in the United States of America has been the aim of the writer of these sketches.*

PERSONAL NOTES.

Professor Lignières, of Buenos Ayres, has been awarded the rank of Chevalier of the Legion of Honour of France.

Professor Barrier, Director of the Veterinary School at Alfort, has been nominated Inspector-General of Veterinary Schools, vice Professor Chauveau, who now assumes the honorary appointment.

Professor Vallée, of the Veterinary School at Alfort, has been nominated Director of the said School, vice Professor Barrier.

Professor Leclainche, Correspondent of the Institute of France, Professor of the National Veterinary School at Toulouse, has been nominated Inspector-General and chief of the veterinary sanitary service.

The congratulations of their English colleagues are extended to the above gentlemen.

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* This interesting series was commenced in our issue of October, 1911, and continued in the November and December numbers.

SOME OBSERVATIONS ON THE CLINICAL SYMPTOMS, PROPHYLAXIS AND TREATMENT OF DISTEMPER.*

By J. P. McGOWAN, M.A., M.D., B.Sc.

Bacteriologist to the Royal College of Physicians Laboratory, Edinburgh.

Indexed B. A. L.

A PRELIMINARY communication on this subject, especially with regard to the bacteriology and pathology of distemper, was made before the Pathological Society of Great Britain and Ireland as early as January, 1910. In this paper, I propose to deal with some points which I have observed, during the last two and a half years, in connection, more especially, with the clinical symptoms of distemper, correlating such symptoms more or less with the presence of an organism, which I describe below.

The following brief *résumé* concerning the organism of Distemper is mainly taken from a paper by me in the *Journ. Path. and Bact.*, vol. xv., 1911, No. 3, p. 372.

The organism to be described below has been obtained by me from pathological processes of somewhat similar nature in the following animals: Dog, cat, ferret, rabbit, guinea-pig, goat, monkey, man. It is usually obtained from the nose or trachea; but in the case of the dog, and most of the other animals, it was also obtained from empyemata of the middle ear, meninges (in a case of distemper chorea, dog only), and from lungs in cases of pneumonia and empyema. It was never obtained from the blood in any of the cases, the condition thus not being of the nature of a septicæmia.

The cases of distemper in the dog, from which I obtained the organism, were drawn from six different kennels in Edinburgh, which kennels had no connection with one another; from a kennel in Dumfriesshire; and from a kennel in Fifeshire. Dr. Leitch has obtained the organism from a case in Dundee. Ferry (*Journal of Infectious Diseases*, June, 1911) has independently obtained the organism from cases of distemper in Detroit, U.S.A.

Characters of the Organism.—The organism is a Gram-negative bacillus, which shows, when stained by carbol thionin, polar staining or a constriction in the middle. Its length varies from 2.3 microns to .5 microns; and its breadth from .5 microns to .4 microns. It is, therefore, very variable in size sometimes,

* This work was done on a Carnegie Trust and Moray Research Grant, for which I wish here to express my indebtedness.

especially when grown in *glycerine agar*, assuming an almost coccal form.) No *spores* are formed. It is feebly *motile* and *flagella* are present. The growth on surface *agar*, when few organisms are present, is very characteristic. At the end of twenty-four hours' incubation a few discrete, *hardly visible*, dew-drops are seen. These enlarge *very rapidly*, and during the next twenty-four hours become as large as pins' heads. They are raised above the surface, are regular hemispheres in shape, and have an opaque white porcellaneous look, with an opalescent sheen. The appearance is as if little pearls had been half-buried in the agar.

On *surface agar*, in which *blood* has been incorporated, the growth is much more rapid, but has the same characteristics.

In *broth*, *glucose broth*, and peptone water there is marked turbidity and later a precipitate settles at the bottom of the tube. There is *no acid* or *gas* formation in the following peptone salt, sugar, &c., media: lactose, cane sugar, salicin, mannite, dulcite, maltose, galactose, raffinose, glucose, inulin, inosite, adonite, sorbite, and dextrin. After a few days, in which no change is visible, the whole of these media become more or less alkaline. In none of the fluid media is a pellicle formed on the surface.

In *litmus milk*, marked alkalinity without coagulation is produced. On *potato* (acid or neutralized) a characteristic brown growth is produced. The organism grows well on *glycerine* agar, with a change in its morphology, as noted above. The organism grows at 18° C. on *gelatine* well, but slowly and without liquefaction. It grows readily *anaerobically*. *Indol* is not formed, nor is *neutral red* reduced.

Pathogenicity.—The organism, when injected *subcutaneously* into dogs, cats, rabbits, guinea-pigs, rats, a pigeon and mice, produced death only in the mice. When injected *intraperitoneally* into the same species of animals, all died with a purulent peritonitis, except the rabbits. Typical *distemper* with the rise of temperature, with the nasal discharge, eye symptoms, and later "chorea" and distemper rash was produced in one puppy by pouring a culture of the organism down its nose; in another pup a much milder form of the disease was produced. The few experiments of this nature done is due to the great difficulty of performing them satisfactorily, owing to the risk of natural infection. From the cases of *secondary* infection a countless

variety of organisms were obtained. The pathological process present in the various clinical varieties of distemper are dealt with below, and consequently I shall not refer to them here.

I consider that distemper may be divided into the following clinical divisions:—

(I) Uncomplicated distemper.

(II) Complicated distemper; divided into the following subgroups: (*a*) Complications due to spread of infection by the *distemper organism* to various parts; (*b*) complications due to added infections by organisms *other than the distemper organism;* (*c*) complications due to *toxins;* (*d*) complications due to causes *other than above.*

(III) Mixtures of the above groups.

I.—Uncomplicated Distemper.

Uncomplicated distemper comprises cases where, although the distemper organism is present in the respiratory tract, the animals may show for long periods practically no outward signs of disease. They may take their food well, be in good condition, and in the case of pups, growth may not be interfered with. Occasionally one may see a fleck of matter at the inner canthus of the eye and a slight watery discharge from the nose. The animals may sneeze occasionally or give a soft husky cough. Their symptoms, however, are so slight that a trained observer may carefully examine them and fail to notice anything wrong with them. Their *temperature,* however, as long as they are infected with the organism, is slightly raised and a certain number of them afterwards develop well-recognized distemper complications.

This first clinical division is based on observations made on twenty-two pups born in the laboratory and kept there. Their temperatures were taken every day from the time they were born to the time they died or were killed. During this time I also examined daily each individual dog for appearance of symptoms. With some of the dogs these observations lasted for a period covering eight months. In addition, less systematic observations were made on other twelve pups in the laboratory and on ten dogs in a private kennel. In all the cases in the laboratory and in some of those outside a *post mortem* was made and frequent cultures were taken from the noses during life. (My views with

regard to complicated distemper were arrived at from observations on the above dogs and from clinical and *post-mortem* examinations of an additional eighty dogs, mostly obtained from outside.)

Where the cases were closely observed, the temperature was found to rise with the appearance of the organism in the nostrils and to fall again with its disappearance. The rise of temperature was usually slight, averaging about 1° C. (39.5° C.). (The normal temperature of the dog is about 38.5° C.).

This was practically the only sign of disease (apart from the presence of the specific organism) in the greater number of the dogs. A few showed, in addition, slight watery discharge at the eyes and nose, and some coughing and sneezing; while a yet smaller number showed ulcers and opacities of the cornea, paraphlegias, and acute congestion of the lung, and death. It is to be particularly noted that none of the dogs in the laboratory showed any of the grave septic pneumonic or abdominal complications to be afterwards described.

II.—Complicated Distemper.

(*a*) Complications due to spread of infection by the *distemper organism* to various parts. In such cases the complication is due to a *pure* infection by the distemper organism.

(1) *Otitis media.*—The special symptoms exhibited by the animal are whining and scratching at its ear with its fore-paw. I have seen three definite cases of this kind. It was very difficult to ascertain in these cases if deafness was present.

(2) "*Chorea.*"—This appears to be due to a spread of infection from the middle ear or roof of the nose to the meninges, thereby causing ameningitis. I have seen three cases of this kind, but only had the opportunity of observing one carefully, as it was one of the cases in which I produced distemper with a pure culture of the organism. From the brain of this animal a scanty growth of the distemper organism was obtained pure, and histological examination of the brain showed the presence of a meningitis. The name "chorea," as applied to this condition is a misnomer, as the movements are not of the same order as in chorea of children, but are indicative of cortical irritation. The symptoms exhibited by the case referred to above were incessant snapping of the jaws, twitching of the eyelids, and jerking of the head from side to side.

(3) *Laryngitis and Tracheitis.*—Although this condition is present in a mild degree in uncomplicated distemper, in some cases it amounts to a complication. The animal is troubled with an almost constant, soft, husky cough, which sometimes ends in vomiting. Personally, I have seen three cases of this kind. *Post-mortem* culture gave a pure growth of the distemper organism in the trachea.

(4) *Congestion of Lungs, Pneumonia and Empyemata.*—Three cases of acute congestion of the lungs, due to the distemper organism, occurred among the closely observed cases in the laboratory. They were cases of uncomplicated disease with slight temperatures in which suddenly the temperature ran up to 41° C. and death occurred in a day. Such a condition may no doubt go on to pneumonia, but in my experience pneumonia begins in a more insidious fashion. Where one gets it *post-mortem* it is usually old-standing and of a purulent broncho-pneumonic type. What has chiefly surprised me in these cases is the extent of the morbid changes in the lung when contrasted with the slight symptoms they produce in the animal during life. I have frequently seen a fat well-nourished pup, running about, playing actively, and taking its food well, and on performing a *post mortem* on it a day or so later have found the lungs practically solid with a purulent pneumonia which must have lasted some time. I have seen nine cases of such pneumonias where the condition was due to a pure infection with the distemper organism.

I have seen two cases of empyema in the dog due to a pure infection with the organism. Here, again, the symptoms exhibited during life did not lead one to expect, as was found, the pleural cavities to be filled with pus and the lung almost completely solidified or collapsed.

(*b*) Complications due to added infections by organisms *other* than the distemper organism. The question arises here as to the justification for the inclusion of these cases in the disease distemper.

The reasons are briefly as follows:—

(1) These cases occur in kennels where simultaneously other dogs are suffering either from uncomplicated distemper or from distemper with complication due to pure infections of the distemper organism.

(2) These cases, in a large number of instances, have themselves been affected immediately previously with the milder forms of distemper described above.

(3) In a large number of these cases the organism of distemper is found, as well as the organisms of secondary infection.

(4) I have shown elsewhere* that in a case artificially infected in the nose with a pure culture of the distemper organism, this organism was entirely ousted from the nasal secretion by a pure growth of a staphylococcus.

(5) I have also shown† in an epidemic of distemper among cats that the distemper organism was entirely replaced by a pure growth of a single other organism.

(6) There are abundant instances in human pathology where the place of the original exciter of a specific pathological process is taken by a set of other organisms having no causal relation to the original disease, *e.g.*, gonorrhœa, broncho-pneumonia in measles.

The question now arises whether the secondary infections are themselves, in some cases, infectious in the sense that they can be passed from a dog thus secondarily infected to a dog whose mucous membranes are debilitated by the previous growth of the distemper organism. (I do not consider healthy dogs in this connection, because I do not think healthy dogs can be so infected by the secondary bacteria found in distemper.)

The following points would lead one to infer that they are infectious in this limited sense of the term.

(1) A pup eight months old, which was suffering from uncomplicated distemper, was placed in the same stall with a pup suffering from a purulent staphylococcal nasal discharge, secondary to distemper. Within a few days the first pup developed a rise of temperature and a purulent nasal discharge due to a staphylococcus.

(2) Five pups from five different distemper infected kennels were sent to a dog show. On the day after return from the show they all became violently ill with purulent discharge from the nose and eyes, weakness, excessive diarrhœa, and somnolence. A *post mortem* on one of them showed in cultures made from the usual sites a variety of organisms, the distemper

* *Journal Path. and Bact.*, vol. xvi., October, 1911, p. 257.
† *Ibid*, 1911, No. 2, p. 257.

organism, however, not being found. Poison criminally administered at the show could not, however, be excluded in these cases.

(3) In my experience, all the dogs with these secondary infections were obtained from private kennels outside. As contrasted with this, I never, except in the case mentioned above, obtained in the dog any case of secondary infections inside the laboratory. I attribute this to the fact that the dogs were strictly confined to it and had no opportunity of coming in contact with a source from which they might obtain these secondary infections.

(4) To quote an analogous instance, it is a well-known fact that broncho-pneumonias secondary to measles are infectious, though these are due to a variety of organisms. One case having arisen acts as a reservoir for organisms, from which the mucous membranes of other cases, debilitated by the primary disease, may be infected.

(1) *Eye Complications.*—I have placed these in this group because I have only once obtained a single colony of the distemper organism from the conjunctival sac; although cultures made from cases with eye complications gave abundant growths of a variety of organisms. The conditions I have observed in the eye are epiphora, purulent conjunctivitis, interstitial keratitis (of a fleeting kind), corneal ulcers, with resultant leukomata.

I consider that these complications are due to a blocking of the nasal duct with consequent damming back of secretions, or to a direct spread of infection from the nose through the nasal duct. They generally occur when the secretion from the nose has become purulent.

(2) *Nose Complications* (including nasal and frontal sinus infections).—As long as the distemper is uncomplicated, the nasal secretion is usually scanty and if it is at all abundant it is watery in character. When it becomes purulent, the disease has become mixedly infected and, as a consequence of this, it is with the greatest difficulty that one can obtain the distemper organism from the nasal secretion, owing to the abundant growth of other organisms. The nose is often blocked with pus to such an extent that the animal has to breathe entirely through the open mouth. In such a case saliva usually dribbles from the angles of the lips.

(3) *Middle-ear Complications* are very common, due to in-

fection with several organisms. In some cases the mucous membrane is merely congested, in others the cavity is full of pus. I have seen ten cases of this condition without, however, any evidence of extension to the brain.

(4) *Pneumonias and Empyemata.*—These are the most common terminations to an attack of distemper. I have performed *post mortems* on forty such cases and have obtained as many as eight different organisms (including the distemper organism) from the lungs of a single case. The pneumonia is broncho-pneumonic in type and purulent in character usually. As in pneumonias due to a pure infection, the contrast between symptoms during life and *post-mortem* findings is great.

(5) The next group of symptoms (usually classed as "abdominal distemper"), to my mind, are not indicative of distemper, *per se*, but of a cachectic septic condition entirely secondary to the disease. The group includes: Wasting, ulcers on mucous membrane of mouth and gums, dirty teeth, stinking breath ("distemper odour"), vomiting and diarrhœa. Usually along with these are included jaundice or "the yellows," and in some cases bloody diarrhœa and passage of pure blood per rectum. Where the symptoms occur, without jaundice and without passage of blood, one finds *post mortem* that the intestinal tract is slightly congested and filled with mucus—evidence of a gastro-intestinal catarrh. Where jaundice has occurred, the duodenum (as well as the rest of the intestine) is filled with pale stringy mucus (absence of bile), and the opening of the common bile duct is occluded by spread of the inflammation to its mucous membrane, obstructive jaundice being thus produced. To aggravate the intestinal symptoms in these abdominal cases there is usually present a large number of worms of various kinds, chiefly ascarides. From *post-mortem* observation I am satisfied that these entozoa can give rise to minor degrees of bloody diarrhœa. Where pure blood is passed *per rectum*, this is evidence of an intussusception of the intestine. This is usually a fatal complication. I have seen it *post mortem* in two cases.

(*c*) *Complications due to Toxins.*—In this group I would place the various paralyses that occur in dogs with distemper. I have seen seven cases of this kind and all the cases were of the nature of a paraplegia flaccid from the onset, which tended to improve with time. Histological examination showed small

celled infiltration of the vessels and grey matter of the cord, a condition indicating poisoning of the cord by some toxin. Cultures made from the cord at autopsy were sterile.

(*d*) *Complications due to causes other than as above.*—The chief complication to be considered here is the rash. I have only seen it three times in about 200 dogs ill with distemper. Thus I saw a so-called typical distemper rash in a pup in which I produced the disease with a pure culture of the organism, and in another pup dead of distemper and from which I obtained easily pure cultures of the distemper organism. The rash, to my mind, is not of the slightest importance in the diagnosis of the disease, as it occurs so very seldom, occurs late in the disease, and in a situation most frequently where irritation of fermenting urine and decubitus cannot be excluded as the most potent factors in its production. Cultures from the pustules, in my cases, have always given pure growths of a staphylococcus.

(*e*) *Mixtures of the above Complications.*—A case may show at one time or at different times several of the above-mentioned complications.

Prophylaxis.

I shall deal with this under two heads:—

I.—Prophylactic injection.

II.—General prophylactic measures.

I.—*Prophylactic Injection.*—As the keeping of a large number of dogs in the laboratory was not practicable, I endeavoured to systematically test the value of prophylactic injection on cats, which readily take the disease and are more easily kept. I did not obtain results of value from these experiments (which I twice attempted), owing to the cats dying from infection by another organism. I have, however, at various times tried on single dogs, previous to their exposure to infection, the protective effect of inoculation with killed cultures of the organism. Such inoculation had no power, in my experience, of preventing the growth of the distemper organism in the upper respiratory tract. Whether it can diminish the death-rate (chiefly due to complications of the septic type) I cannot say, as my cases were relatively few in number and were not exposed to conditions likely to give rise to septic complications. There is the possibility, however, that prophylactic inoculation may prevent toxic

phenomena. In a litter of four pups on which observations were made, the two vaccinated pups showed no nervous symptoms, although the distemper organism was obtained from their noses, while the two controls developed paraplegia. The whole question, however, is eminently one for further investigation on a large scale.

II.—*General Prophylactic Measures.*—General measures undertaken with a full appreciation of the following facts would, I am sure, greatly curtail the disease.

(1) That dogs, to all outward appearance in perfect health, may be carriers of the organism, and may be capable of passing on the disease to healthy animals. This not only applies to young animals (on which the disease has a greater incidence), but also to older animals, such as mothers of litters of infected pups. A certain number of these animals can be detected by taking the temperature, but the only exact method of detection is by making cultures and observing the presence or absence of the organism of distemper. (An infected animal may be a carrier of the organism for at least three months—and possibly much longer, especially if there is middle ear or frontal sinus complication.)

(2) That animals, other than dogs, as I have shown elsewhere*—*e.g.*, cats, ferrets, rabbits, guinea-pigs, goats, monkeys and man—can contract the disease and are possible centres for its dissemination.

(3) That the sequelæ and grave complications due to mixed infections are in all probability infectious in the sense that a dog so infected may act as a reservoir from which organisms may be supplied constantly for infection of the mucous membranes of other dogs debilitated by the presence already of the distemper organism.

Treatment.

Under this heading I shall refer especially to any special lines of treatment I have tried with their results.

(1) Attempt to limit the secretions of the nose by means of anti-secretory substances, such as atropine. Result: No benefit observed.

(2) Removal of excessive secretion and cleaning of nose by sternutatories. Result: No benefit observed.

* *Journal Path. and Bact.*, 1911, vol. xv., No. 3, p. 372.

(3) Local application of antiseptics to the respiratory mucosa. No benefit observed.

(*a*) Hydrogen peroxide introduced into the nose. Result:

(*b*) Vaporized volatile antiseptics for inhalation. Volatile antiseptics were vaporized by heat in such a way (with free access of a current of air) as to form a concentrated mist of fine particles of the antiseptic. These would presumably, after inhalation, settle on the mucous membrane of the respiratory tract. Previous to trying this procedure on animals numerous experiments were done to test the effect of volatile antiseptics so vaporized on surface agar cultures of the distemper organism. The object was to obtain a substance of maximum bactericidal powers, which at the same time possessed minimum injurious qualities for the tissues. Various volatile oils, such as turpentine, eucalyptus, lavender, thyme, &c., as well as carbolic acid and creosote, were tested. All of these substances readily killed the distemper organism in a very short time. Creosote was discarded because of its irritating nature, and carbolic acid because of its poisonous effects locally and after absorption. A volatile oil was selected and turpentine was used as it was the cheapest and as efficient as any. Notwithstanding the fact that the organisms in the nose are surrounded with mucoid secretion (in this respect differing from their condition in the experiment mentioned above), I have seen distinct benefit from the use of turpentine by this method.

(4) *Vaccine Therapy.*—I have used this in one kennel where the dogs were suffering from uncomplicated distemper with, I think, marked benefit. The vaccine used was an autogenous one.

(5) *General.*—Provision of a plentiful supply of fresh air and the maintenance of an equable and moderate temperature, with the avoidance of anything likely to hamper the animal's respiratory movements, of overheating, of stuffy, close rooms, and overcrowding, are important adjuvants in the treatment of this disease. The keeping of the animals in surroundings which are easily cleaned and disinfected, and the rigid isolation of cases which show signs of secondary infections, are important both in the treatment of the individual dog and in limiting the spread and gravity of the infection. Where an intussusception has taken place surgical interference is indicated.

URINARY CALCULI IN THE HORSE AND DOG.*

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URINARY calculi must always be considered serious in any animal from the possibilities of painful and even fatal consequences they often entail. The subject is no new one in veterinary practice, and indeed interest in this question has existed from the commencement of an educated veterinary profession in this country, as may be seen by perusing veterinary literature for the past 100 years. In the pages of that fund of information, *The Veterinarian*, cases of calculus formation are recorded from the very first volume (18). Several lengthy papers have been contributed at intervals in the journals, or to veterinary societies such as this, notably a detailed article by Professor Axe, to be found in *The Veterinarian* for 1887-8-9. The present speaker sets up no claim to bring forward anything very original on this subject, but rather desires to introduce for your consideration a disease which is full of interest as regards diagnosis, effects, and treatment. A discussion on such a subject can hardly fail to be useful to all of us. To treat the subject of urinary calculi in general would require too long a time, and, even dealing with the horse and dog only, many points must be passed with brief mention. At the same time the problem of causation in the different animals is intimately related to the chemical reaction of the urine, and therefore differs considerably in herbivora, in which the urine is normally alkaline, and in carnivora, where it is normally acid. It is for this reason I have selected an example from each group.

THE URINE.

The urine is a watery solution of organic and inorganic substances which are being excreted from the body, the solution depending on definite chemical and physical conditions. In composition the urine of the horse and that of the dog differ greatly, and must be considered separately. That of the horse is a more or less turbid, yellow, or yellowish-brown liquid, with a specific gravity of 1040. The turbidity is due to the presence of suspended (undissolved) calcium and magnesium carbonate, and the thick syrupy consistence is partly due to a large amount of

* Read at a meeting of the Royal Counties Veterinary Medical Association.

mucin. The reaction is faintly alkaline, due to the presence of potassium carbonate (the form in which the vegetable acids, tartaric, citric, malic, &c., are excreted). The total daily amount is somewhere about 10 pints. The chief organic constituents are urea (about 3½ oz. daily) and hippuric acid, and in health there is no uric acid. During an acute fever, when the horse is eating no vegetable food and active metabolism is going on, uric acid is formed and excreted, for the animal for the time is carnivorous. The chief inorganic substances are potassium and magnesium salts, chlorides, sulphates, carbonates, and phosphates. Phosphates are only present in comparatively small amount in a horse's urine, and, in addition there may be small amounts of oxalates. If normal horse urine be allowed to cool, and then the sediment be examined microscopically, it will usually be found to contain crystals of calcium carbonate and, less often, of calcium oxalate.

Here, then, we have as obvious possibilities the precipitation and concretion of calcium carbonate, or earthy phosphates, and rarely of calcium oxalate. Uric acid and urates we do not expect to find as constituents of urinary calculi in horses.

The urine of the dog is normally acid in reaction when the animal is fed on a meat diet, due to the presence of acid sodium phosphate (Sodium dihydrogen phosphate, NaH_2PO_4) and acid calcium phosphate ($Ca(H_2PO_4)_2$). The specific gravity is usually between 1040 and 1050, and the fluid is generally light yellow and clear. The chief organic constituents are urea and the alkaline salts of uric acid in a dog properly fed on meat. Of the inorganic substances sodium is greatly in excess of potassium (the reverse of the condition in the horse), and the acid phosphates are well-marked constituents. Here the likely substances to be precipitated and form calculi are the earthy phosphates and the uric acid. A dog fed on biscuits for several days will pass urine which is neutral or even alkaline, and if such feeding is alternated with days of meat diet there is a frequent change of reaction of the urine which is very favourable to precipitation of inorganic salts.

Composition and Characters of Calculi.

In the horse by far the commonest calculus is one composed of calcium carbonate or chalk. In colour these stones are usually buff-coloured, and have a studded, nodular, or irregular surface.

If deposited in the bladder the shape is generally oval, whilst those laid down in the kidney are irregular, often looking like a gnarled tree root. Much less common are phosphatic calculi —either calcium phosphate or ammonium magnesium phosphate (triple phosphate). These are lighter in colour and have a smoother surface. Frequently there may be found a calculus made up chiefly of carbonate, but partly of phosphate. Sometimes, too, there is a small admixture of calcium oxalate. The common chalk calculus of the horse is most usually single. Another form of deposit met with not infrequently in the horse is that known as the sabulous deposit—the bladder being filled in some cases with a sandy material, sometimes fine, sometimes coarse, and in irregular grains. The material is usually chalk, or a mixture of chalk and phosphates.

In the dog the commonest calculus is that composed of triple phosphate (ammonium magnesium phosphate). Such calculi may either be quite small and multiple—the common type giving rise to obstruction of the urethra—or large, remaining in the bladder and occurring either singly, or two, or sometimes three together. Of the small ones the shape is roundish, but may be irregular, and the surface is usually smooth. Of the larger ones the commonest shape is oval, and the exterior is slightly roughened or nodular as a rule, though quite smooth ones are found. Where two or more of these large stones are found in the bladder they are often faceted, the flattened or concave faces having been produced as a result of friction. Much less common are uric acid calculi, and calcium oxalate ones are also rare. Of the very rare organic calculi made up of cystin, xanthin, tyrosin, &c., nothing need be said here. Ammonium urate is a rare concretion sometimes found.

Let us next consider the conditions favourable to the precipitation of solids in the urine.

(1) *Alteration of the Chemical Reaction.*—As the urine of the horse cools the turbidity may also be noticed to increase; that is, more calcium carbonate (chalk) is thrown down. Further, if left to stand awhile, the urea becomes decomposed into ammonium carbonate by the action of the ubiquitous *Micrococcus ureæ*,

$$CO\begin{matrix}NH_2\\NH_2\end{matrix} + 2H_2O = (NH_4)_2CO_3$$

so that the urine becomes markedly alkaline and ammoniacal. and more chalk is again thrown down. Similarly, in the case of the dog, when urea is decomposed and ammonia liberated, there is at once a deposit of the earthy phosphates, viz., calcium phosphate and ammonium magnesium, or triple phosphate. In the living animal this condition is brought about most commonly as a result of bacterial invasion of the bladder or other part of the urinary tract. The causes of infection commonly operating are:—

(*a*) Soiling of the vagina after parturition, especially when metritis results. From the vagina organisms easily gain access to the bladder.

(*b*) Infection from the outside as by means of a catheter, either itself dirty or introducing septic matter from the urethra; and

(*c*) Infection from the kidney as in cases of tuberculosis or pyæmia.

(2) *Concentration of the Urine.*—The urine becomes concentrated in cases of high fever where all the secretions are lessened, after severe hæmorrhage, when the animal has been sweating profusely, and in cases of diarrhœa. The same happens when too little drinking water is given to the animal. In such circumstances salts tend to be thrown out of solution.

(3) *Retention of Urine.*—The most important factor favouring the formation of calculi is retention of urine in the bladder from any cause. The urine remaining in the organ favours sedimentation, and, since the bladder is not frequently washed out, assists infection. Retention may be brought about by any obstruction, as, for example, an enlarged prostate due to hypertrophy or tumour formation, as is seen sometimes in the dog; or to stricture of the urethra, possibly caused by a former calculus having damaged the mucous membrane. Again accumulations and concretions of sebaceous matter and salts in the navicular fossa at the end of the urethra, or malignant growths of the penis, or paralysis of the bladder (bladder, rectum, and tail) will all bring about obstruction. In the dog the ingrained habits of cleanliness and infrequent exercise sometimes combine to cause retention.

(4) *The Presence of a Nucleus.*—Such a nucleus may be a blood-clot, some mucin, or epithelium, or renal casts, or inspissated pus. The common illustration of the fur in a kettle

massing round a marble will serve to make the point clear. We have examples of the same action in the gradual growth of a thrombus inside a vessel, or, perhaps more nearly analogous, a growth of intestinal calculi round a piece of metal or other foreign substance. There are many cases on record where foreign bodies have served as the nucleus for urinary calculi. Sometimes it has been a piece of a broken catheter, or some instrument introduced maliciously, especially in the mare, and one particularly interesting case recorded by Mr. Hunting may be mentioned where a piece of stick some 4 in. in length was found in the bladder and had evidently come through from the pelvic flexure of the colon at some previous time. Again, a splinter of bone from a fractured pubis, or a parasite such as the *Eustrongylus gigas*, which may invade the kidney, will serve as a nucleus. Not uncommonly, one calculus may become the nucleus for a deposition of a totally different material. Uric acid may be surrounded by phosphates, or chalk and phosphates may be mixed together.

There are a number of cases where none of the above conditions can be definitely proved to exist, and here we must fall back upon:—

(5) *Either the Nature of the Food or Constitutional Tendency.*—Let us take uric acid as an example. According to Halliburton, the percentage of this substance in the urine is increased by (*a*) Excessive meat diet and diminished oxidation; that is, want of exercise and fresh air; (*b*) pathological conditions allied to gout; (*c*) increase of white cells in the blood; for example, in leucocythemia (leucocytes contain nuclein which is allied to uric acid); and any increase of uric acid excreted is favourable to this deposition in the urine. Similar remarks may be made about the other calculi when the food or water is such as to provide an excess of their ingredients.

(6) *The Sex of the Animal has a bearing upon Calculus Formation.*—Probably on account of parturition the bladder of the female is more commonly infected than that of the male; but even when this happens the short wide female urethra does not favour retention or obstruction. On the other hand, in the horse (male) with a long urethra, having the navicular fossa at its extremity, and a prepuce which may be the very reverse of clean, obstruction is by no means uncommon. In the dog the presence of the os penis is a great factor in causing obstruction.

Effects and Symptoms.

Now let us turn to consider the effects and symptoms produced by calculi. Here again we will only deal with the most important practical points. Renal calculi are not very common in either horses or dogs, and, when they occur are extremely difficult to diagnose. The symptoms are those of indefinite abdominal pain, often associated with some blood in the urine, but they may be so slightly marked as to call for no notice, and the calculus may only be discovered at *post mortem*. A calculus in the kidney is often the starting-point of abscess formation and nephritis, and when such occurs an acute fatal termination will be the sequel sooner or later. If suppuration does not occur and the other kidney remains normal, the affected organ simply wastes and may become, as in the specimen shown, a mere shell of tissue containing stones. Sometimes small calculi from the kidney pass down into the ureter and may be there obstructed. The obstruction is likely to occur either at the brim of the pelvis, or just where the ureter enters the bladder. In such a case the flow of urine from that kidney is prevented, the tube becomes widely dilated, the kidney itself enlarged and saccular, and on the occurrence of acute symptoms and pain a rectal exploration will often discover the dilated tube running down towards the pelvis. This condition is very rare and need not be expected often.

Much more common are vesical or bladder calculi, for here the urine collects and may stagnate so that sedimentation and precipitation are by no means uncommon. The symptoms are fairly characteristic. Frequent micturition pointing to some irritation of the bladder, sometimes the passage of blood, straining after passing urine, and a straddling gait are common, and if the urine be examined an excessive amount of solid matter is often found. Further, the urine may be ammoniacal or stinking, a condition which favours calculous formation. The diagnosis need not be in doubt in the majority of cases if a rectal examination is made. In the dog the urine may be retained and the bladder can be felt through the abdominal wall in a much distended condition. This, of course, only occurs where the vesical calculus is obstructed in the neck of the bladder so that urine cannot escape. In most cases the symptoms will continue,

sometimes more sometimes less acutely, for a considerable time, until finally complete obstruction results. Calculi in the bladder of the horse are perhaps most commonly single. They may, however, be multiple and fairly often a sandy or sabulous material may almost fill the organ. The serious dangers of calculi in the bladder are (1) the occurrence of cystitis and the spread of the infection up the ureter to the kidney so that pyelo-nephritis is caused, with a fatal termination; (2) obstruction to the outflow, retention of urine, and rupture of the bladder, bringing about peritonitis, and again ending fatally.

Even where these more serious results do not follow, the irritation of the stone often results in a chronic thickening of the wall of the bladder, with more or less ulceration of its mucous membrane. Sometimes, however, retention causes such stretching of the walls that the mucous coat is pushed out in the form of sacculi between the network of muscular fibres. In these sacculi salts may be deposited and it is in this way that calculi encapsuled in the wall are formed. They are of some importance because of the great difficulty in their removal.

On the other hand, bladder calculi are often passed down into the urethra, and they may obstruct this tube partially or completely at various points. In the horse a common situation for the obstruction is the perineum, an inch or two below the anus, but the stone may rest anywhere in the tube right down to the external orifice. The latter, in fact, may be considered the second most common situation. In the dog small stones pass from the bladder and almost invariably become obstructed where the urethra passes into the bone of the penis, and when several stones are present a chain of them may block the urethra from behind this point right back to the bladder. Any case of urethral obstruction must always be considered serious and urgent, for, if unrelieved, the animal will die either from retention of urine and uræmic poisoning, or from rupture of the bladder. In these cases no urine can be passed, though frequent attempts are made. The dog evinces great pain, especially if the abdomen be palpated; and further, a distended bladder will then be discovered. In the horse, in addition to the pain and retention of urine, the obstructing body may cause a swelling quite evident when the perineum is examined.

Methods of Diagnosis.

Let us now consider how the diagnosis of urinary calculus can be made.

When suggestive symptoms have arisen there are various methods which can be adopted to determine the diagnosis. A physical examination should be made of the different parts of the urinary tract. A rectal exploration will indicate the conditions of the bladder and the presence of a stone; it will often reveal any obstruction of ureter, but will give little or no indication of the condition of a kidney. In the dog the kidney may be examined by using morphine and then palpating through the abdominal wall, whilst fairly definite symptoms pointing to kidney disease warrant an exploratory laparotomy. An examination of the urine is of great value. The frequency of micturition, the amount of urine passed at a time, and its naked-eye characters help to form an opinion. If it contains blood, if it deposits a considerable amount of sediment containing mineral matter, and if its chemical reaction is more alkaline than normal, great support is given to the idea of calculus. The presence of pus is an additional confirmation and is determined by microscopic examination of the sediment from urine. In the case of obstruction of the urethra inspection of the perineum may be alone sufficient to discover the cause, for the stone will be seen causing a swelling in that region, the urethra behind it being distended. An attempt to pass a catheter will likewise discover any obstruction in the urethra, and in the dog this method affords a diagnostic sign. A grating of the catheter against the rough stone is a very common indication of urethral calculus in the dog. In the mare or in the horse, after the operation of urethrotomy, a metal sound can be passed into the bladder, and this by contact with a rough hard substance determines the presence and to some extent the size of a calculus. Some more modern methods of diagnosis may be used with advantage, for example, X-ray photographs in the dog. It is important to remember in this connection that calculi of different chemical composition will give shadows of very different density, the purely inorganic stones giving a dense shadow, whereas those composed of organic matter (uric acid, urates, cystin, &c.) are with difficulty seen. For stone in the kidney this method is usually the first in importance, although not

so important for stone in the bladder. In the mare or in the horse after urethrotomy it is possible to inspect the interior of the bladder by means of an instrument called a cystoscope. This in its simplest form consists of an illuminating apparatus with a series of prisms and reflectors, so that the interior of the bladder is lighted up and can be seen through an eye-piece. With this instrument the orifices of the ureter can be inspected to see if they are equally patent, and the mucous membrane of the organ critically examined.

It is important to differentiate urinary calculus from several other conditions which may exist in the horse and dog. Irritation of the urinary tract with hæmaturia, frequency of micturition, and straining may be caused by poisons such as cantharides, but the symptoms either become gradually aggravated, causing the animal's death, or pass off in a few days. Blood in the urine may also result from simple or malignant tumours in the bladder, papillomata not infrequently cause this both in horses and cattle. In attempting to distinguish, it must be remembered that a tumour in the bladder rarely obstructs the flow of urine, is felt to be softer on rectal exploration, gives no ring or grating with a metallic bladder stone, but that shreds or particles from the growth may be frequently discovered in the urine removed with a catheter. These points are generally sufficient to distinguish such a growth from calculus. In the dog there are various causes of bleeding from the penis or vagina, which may suggest a urinary calculus. The infective granulomata affecting the body of the penis or the vagina have both given rise to a diagnosis of stone in the bladder causing bleeding. Simple examination at once clears up the error. In the same way uterine hæmorrhage may have to be distinguished from hæmaturia, but what little difficulty there is is at once resolved by obtaining a catheter specimen of urine which is found to be free from blood.

Treatment.

After this somewhat inadequate discussion of a wide subject, let us turn to the question of treatment.

The treatment of urinary calculus has passed through many stages. In the early days of medicine it was commonly thought that these stones could be dissolved *in situ*. The method of *solution* (*a*) *by medicine given by the mouth*, is now known to

be useless. It fails for the reason that it is practically impossible to get the solvent drug into the kidney or bladder in the *form* required. Chemical processes in the stomach, intestine, and blood, change the agent given so that it becomes ineffective as a solvent in the urine. Further, in those cases where the solvent is excreted in a suitable form it is quite impossible for it to be sufficiently concentrated to have any appreciable effect on the stone. A solvent needs to be fairly strong and to act for a considerable time, and these conditions do not obtain in the cases we are considering. (*b*) *By solvents introduced into the bladder* was perhaps somewhat more reasonable. Here again, however, the method fails because the agent cannot be used in sufficiently concentrated form, or is not left in contact with the foreign body for a long enough time. It is obviously useless for stones in the kidney, and when the urethra is obstructed it cannot be applied.

We are driven back then upon methods directed to *the removal of the stone*. So far as stone in the kidney is concerned, the condition is quite inoperable in the horse in the present state of our abdominal surgery. In a dog, if a stone in the kidney is diagnosed, the choice is between the opening of the abdomen, incising the kidney and removing the calculus, or destroying the dog. Under those circumstances operation is well worthy of a trial and presents no insuperable difficulty. The kidney substance is often thin and little cutting has to be done to extract the stone. Before suturing up the organ it is always well to explore the ureter to make sure that no obstruction is present further down the canal. An X-ray photograph materially helps the surgeon.

Vesical calculi may be extracted either whole or after crushing, depending on the size and the animal. In the mare it is surprising what large calculi may be extracted through the urethra, which is capable of very considerable dilatation. The animal must be anæsthetized and the stretching of the orifice done gradually so as to fatigue the muscular fibres without rupturing them. Lithotomy forceps, sterilized, warmed and lubricated are introduced, the stone seized and gently withdrawn. In the horse extraction whole can be practised after urethrotomy has been performed. The urethra is opened in the perineal region just below the anus, a sound passed into the bladder, and the con-

dition of the calculus determined. The orifice is then stretched as much as possible and the stone carefully withdrawn in a similar fashion to that used in the mare. The urethral wound generally does quite well without suturing and with comparatively little after-treatment, except that dictated by cleanliness. Where the stone is too big for extraction whole, the operation of crushing or lithotrity may be attempted. The common chalky stone found in the horse is fairly readily crushed. Great care is, however, necessary to avoid including any of the mucous membrane in the jaws of the lithotrite along with the calculus. It is an advantage if a fair amount of fluid can be retained in the bladder while the lithotrite is being applied, for the reason that this lifts the mucous membrane out of the way. After crushing the fragments are extracted with forceps or with a spoon, or by flushing out the bladder with warm boracic acid solution or other simple antiseptic.

In the dog removal is best performed by opening the bladder above the pubis and an incision alongside the penis is the one used in the male, whilst, in the female, the median incision is employed. A point of some importance after opening the bladder is that sutures inserted to close the incision should not go right through the thickness of the wall. They should be inserted like Lambert's bowel sutures through the serous and muscular coats, leaving the mucous layer unpunctured. The reason is that sutures penetrating the bladder form a nucleus on which salts may deposit, and this, of course, should be avoided. The dog, if not too far gone, is a good subject for this operation, and cases usually do well. It is only where retention and uræmic poisoning have ensued that unfavourable results need be expected.

When the calculus is impacted in the urethra removal is not, as a rule, difficult. Sometimes in the horse and mare the mere giving of an anæsthetic which relieves spasms will allow the stone to be gently moved down the tube. Should the stone be in the navicular fossa it may be extracted by hand without any cutting being necessary. Often, however, an incision into the urethra at a point where the stone is located is necessary, and following that little further need be done. The stone is gently withdrawn by means of a pair of strong forceps, the canal is examined to be sure that no further obstruction exists and the case will then usually go on to a successful issue. It is well to

make sure that the bladder itself does not contain other stones likely to cause obstruction later on, any present should be dealt with at the same operation. In the dog the urethra is almost invariably impacted just behind the bone of the penis. Sometimes when the animal is deeply anæsthetized the offending stone may be expelled. More often the urethra must be opened. When this is done it will frequently be found that, posterior to the obstruction, a chain of small stones extends back to the bladder, and the bladder itself may contain a large number of small calculi, potential sources of obstruction unless removed. Flushing of the bladder should be repeated until this danger is overcome. The urethral wound heals as a rule without difficulty and the onset of stricture is not a serious or likely contingency. It is well to examine the urethra anterior to the incision, that is, along the bone and up to the meatus, for small stones may have located there. These should be expelled by a soft flexible bougie.

After-treatment.—After operation little need be done, except to attend to any wound that may have been made, and to see that urine does not excoriate the skin around. At the same time, the urinary tract should be rested as much as possible, the diet should be light, in the case of the dog soups and milk only being given. In all cases laxatives or even purgatives are advisable and alkaline diuretics that flush out the kidneys and bladder are useful. Such sedatives as belladonna and hyoscyamus are useful to prevent irritation, whilst antiseptics (the best of which is urotropine) serve to prevent or clear up infection.

With regard to the prevention of recurrence, not much can be done, but remembering the factors predisposing to calculus formation, the diet should be regulated, exercise prescribed, at any rate, in the case of the dog, whilst cleanliness of the prepuce should be enjoined in the case of the horse. Any inflammation of the urinary tract, such as cystitis, must be looked upon as a likely cause of calculus and treated vigorously and thoroughly.

HAND-DRAWN *VERSUS* MACHINE-DRAWN MILK.

(A Bacteriological Investigation.)

By W. NORMAN MACDONALD, B.V.Sc.
University Veterinary Research Institute, Melbourne, Australia.

General Summary of the Comparative Bacteriological Examination of Hand and Machine-drawn Milks Supplied by the Lady Talbot Milk Institute.

Indexed B. A. D.

This investigation was undertaken in order to ascertain the relative bacterial content of milks drawn by hand and by machine, under, as nearly as possible, the same conditions.

Four cows were selected by the supervisor and myself, all being approximately of the same breed, condition and general health, and each giving about the same quantity of milk. Two were carefully milked by hand and two by machine. In addition to the customary washing of the udders and the thorough brushing of the sides and flanks before milking, every care was taken to prevent dust and hairs falling into the bucket during the process of milking by hand. The milking was carried out practically simultaneously on the four cows. Fair samples from each pair were secured by Mr. McAdam, the supervisor, bottled and immediately cooled to about 40° F. These bottles were retained at a low temperature until delivery at the Laboratory in the early morning, where they were placed in an ice-chest until testing, the culture media being inoculated usually eighteen hours after withdrawal of the milks from the cows.

Throughout the test the appearance and palatability of both milks were excellent, no taint or odour even being detected, and the bottles on standing showed a good layer of cream. In regard to ordinary keeping qualities, the milk when kept in the ice-chest at from 60° to 65° F. invariably remained perfectly sweet to at least forty-eight hours after milking. As a rule both samples developed sourness about the same time.

Before considering the results it should be observed that on one occasion an exceptionally high bacterial count was obtained (about 80,000 bacteria per cubic centimetre), both samples showing the same abnormality. This number in itself would be considered a fairly low content in ordinary milk eighteen hours after milking, but compared with that of previous and subsequent

samples it was a very high content. For example, on the day before the test showed for hand 5,500, and for machine 1,000, while on the day following the numbers were for hand 2,500 and for machine 4,750 per cubic centimetre. That some very unusual circumstance had been operating on the day in question was obvious, and this became more certain when it was found that Dr. Bull's result from the same day's sample as sent to him from the ordinary supply was also unusually high.

The supervisor's attention was promptly drawn to the circumstance, and after careful inquiry we were forced to the conclusion that on the day in question a certain batch of bottles had been ineffectively sterilized. Indeed, any other explanation would be inadequate.

In these circumstances it has not been considered advisable to include that day's result in estimating the average number of bacteria present in each day's supply.

On several occasions samples were delayed through various circumstances, so that they did not arrive at the Laboratory until the second day after milking. On one occasion, also, owing to accident, the milk arrived at a temperature approaching blood heat. Such circumstances naturally conduce to an unduly high bacterial content; consequently the tests of these samples are not included in this summary.

During the months of January, February, and March the tests were conducted almost daily. They were also continued during April, when, however, probably owing to the cooler weather, a definite general decrease in the bacterial content of both milks was experienced, the total number in each often falling below 250 per cubic centimetre. For this reason the counts secured in April have not been included in the averages given below.

As already stated, the milk at time of testing was, as a rule, eighteen hours old, having been milked the previous afternoon. The temperature varied between 50° and 60° F., being rarely found under 50° F. at time of testing, although placed in the ice-chest soon after receipt.

Throughout the period under review the average number of bacteria present per cubic centimetre was, in the hand milk 7,450, and in the machine milk 6,780. Naturally there was often a decided difference between the bacterial content of the two samples. For example, it was found that on twenty-five-occasions

the hand milk contained at least twice the number of bacteria present in the machine milk, while on twelve days the machine milk showed at least double the number found in the hand milk.

For the first six weeks the strippings of the two machine-milked cows were added to the bulk before the sample for examination was secured. Subsequently, however, this practice was discontinued, it being considered that such a method was really not fair, either to the hand or the machine, as, of course, the strippings were removed by hand.

That the removal of the strippings by hand and their subsequent addition to the machine milk seemed to deteriorate the latter from the standpoint of bacterial purity is indicated by the following figures. During the period when this practice was adopted the hand milk showed 5,100 bacteria per cubic centimetre, and the machine milk showed 10,700 bacteria as daily average, but during the following period, when no strippings were added to the machine-drawn milk, the average figures were 9,600 for the hand, and but 3,600 for the machine.

It must not be understood, however, that any definite and absolute conclusion can be drawn from these figures, for, as a matter of fact, during the first half of the first period the average tests were much more approximate than during the second half.

In conclusion, the results secured forcibly demonstrate the fact that provided the machines are thoroughly attended to in all necessary details, as was the case in this instance, there is no reason for assuming that milk drawn by the machine should be more contaminated with bacteria than that drawn by ordinary careful hand milking.

Clinical Articles.

FISTULA OF THE CROUP IN A HORSE.

By J. J. O'CONNOR, M.R.C.V.S.
Professor in the Royal Veterinary College of Ireland, Dublin.

Subject.—A chestnut trooper mare, aged.

History.—A little over twelve months ago an abscess burst on the croup and afterwards closed and burst alternately, the condition now being that of a sinus.

Symptoms.—A purulent opening on the highest point of the croup, extending downwards for several inches through the gluteal muscles of the near hip, and discharging a copious quantity of thick, yellow pus.

Treatment.—Cast and anæsthetized. Passing a sound into the sinus and the hand into the rectum, the suppurating passage was found to be only separated from the rectum by the thickness of the rectal wall, at about 4 in. in front of the anus; made a counter opening here and flushed the sinus out through the rectum. Afterwards it was found that there was also a communication with the vagina, and it was considered that the case was not worth further treatment. Consequently the mare was taken away and destroyed. No *post-mortem* examination was made.

"LUXATION" OF THE PATELLA IN A MARE.

By MAXWELL EDGAR, M.R.C.V.S.
Wanganui, New Zealand.

A LIGHT draught-mare, aged 4 years, in regular work, used in a cart. A week before I saw the mare, the owner informed me she was found in the paddock with her leg extended backward and fixed. A stockman saw her and smartly struck her with his whip; the mare springing quickly forward, the leg resumed the normal position, and lameness disappeared.

I saw the mare on September 11. The near hind-leg was extended backward and fixed from stifle to fetlock. The patella could be felt displaced outwards. Pressure with thumbs on the outer edge of the bone forwards and inwards reduced the dislocation, the bone moving easily into its normal position with a click, and the limb could easily be drawn forward and flexed.

The mare was made to move forward. This she did easily, until the weight was thrown upon the affected limb, and the position passed the perpendicular on its travel backwards; then it immediately became displaced and the limb fixed backward, the same process with pulling the leg forward again easily reduced the displacement, but on moving one step forward the same trouble occurred again and again.

The limb was finally fixed forward with rope and collar.

Next day I was again requested to attend, and found the rope had slackened, thus allowing the leg to move backward and the patella again displaced. I placed a hobble on the pastern, a rope being fastened to the ring. The leg drawn forward, the patella again in position, the rope was passed through a surcingle and fastened to the collar. This prevented the rope becoming slack. The mare hobbled about in a small enclosure for a week. The rope was removed, and she was turned out to grass. No further trouble has occurred up to date.

This case seems to me to be of interest, and peculiar by reason of the fact that it was a case of displacement, and not, as is so often the case, simple retention of the patella at a certain point of its journey on the trochlea of the femur.

The displacement was, as usual, outward, the bone being so easily reduced that nothing further was required but to draw the leg gently forward, pressure with the thumbs causing the patella easily to its normal position with a characteristic "click."

The outward displacement points to injury of the internal lateral ligament, allowing the patella to slip off the trochlea at a certain point of travel. Keeping the limb flexed for six days brought about recovery.

IMPACTION OF THE SMALL INTESTINE IN A HORSE.

By C. N. MEYERS, L.V.Sc.
Melbourne.

Impaction of the intestines, though by no means rare, sometimes offers to the veterinarian features of some special interest. A brief account, therefore, of a case which recently came under my care may merit its recordance.

The animal in question, a pony, was brought to my hospital after having been in pain for about twelve hours. The pain

appeared subsequent to being brought in from the grazing paddock and receiving one feed of bran and chaff.

The mucous membrane was congested; pulse, 50; temperature, 102° F. Auscultation on both sides of the abdomen showed but little peristalsis of the intestines, and tympany was not apparent. The bladder was distended, a large quantity of urine being taken away. Enemata on voiding contained a few hard fæces, and on rectal examination a hard mass could be felt on the left side, passing obliquely backwards towards the right.

A drench, consisting of spts ammon. co., ol. terebinth, and ol. lini., was given, enemata being continued hourly. This treatment was negative in result, so that eserine and pilocarpine were administered hypodermically. This and further treatment was of no avail, the animal finally dying within thirty-six hours from time of receiving. Syncope was the immediate cause of death.

Post-mortem examination showed excessive distension of the stomach and small intestines with gas. The large colon was practically empty. The cæcum contained a few hard pellets of food material, a little sand, and an enormous number of nematodes—the *Sclerostoma equinum*. At the ileo-cæcal valve, within the cæcum, was a large nest of tapeworms, and at this point the mucous membrane was necrotic and of a dirty grey colour.

Situated immediately anterior to the ileo-cæcal valve, within the ileum, and filling that portion of the intestine for a length of about 2 ft., distending the lumen to a diameter of 4 in., was a firm mass of the recently-ingested food material.

Summary.—In this case the tapeworms seemed to have caused a paralysis of the intestinal wall at the ileo-cæcal valve. While at grass simple and regular feeding of a continuous nature caused possibly but little inconvenience, so that the animal remained in fairly good condition. Under the added embarrassment, however, of a bulky dry feed, the already weakened stomach and intestines were apparently unable to adapt themselves to the altered conditions, with the result that impaction took place at the weakest point.

Canine Clinical Notes.

A FEW CANINE MOTOR ACCIDENTS.*

By F. J. TAYLOR, M.R.C.V.S.
Birmingham.

No doubt many of the members present practise in districts where motor cars are "occasionally" seen in the streets, and they invariably have a casualty list to account for in the shape of dogs, a great number of which are rolled over and over under the chassis and come out at the other end simply shaken, frightened and covered with dust, whereas others suffer from injuries so remarkable, and so unlike other injuries, that I thought a few cases of this nature might be interesting to those canine practitioners in large towns, where motor cars frequently bring in a little grist on the one hand to compensate for the financial loss they cause to our business on the other hand.

Correct diagnosis on the spot is often an impossibility owing to the complex nature of the symptoms presented immediately after the accident. The usual history is that owner was exercising his dog which strayed into the road, and a motor coming along at quite a regardless speed, alarms the owner, who calls the dog, and in this way distracts his attention for the moment from the car. The driver of the car trusts that the dog may obey his master and proceeds, but the dog remains stationary. The result is an almost unavoidable collision, in which the starting handle, radiator, ends of the springs, tyres, or the chassis play an important part, and the victim is extremely lucky to come out at the other end (as frequently happens) simply very dirty, bruised, and frightened. On the other hand, more serious consequences may ensue, as the following instances will illustrate:—

I. A wolf hound, after collision with a large car, was run over by both near side wheels without any external injuries being inflicted. It was brought to me in a totally paralysed condition, being unable to move any limb, and having quite lost the powers of retention. He remained in this condition for five days, being artificially fed. Catheters and enemas were used

* Read before the Clinical Meeting of the Midland Counties Veterinary Association at Birmingham.

three times daily, counter irritants were applied to the spine, and iodide of potass. and strychnine administered internally. Complete recovery took place from the sixth day.

II. An Irish terrier jumped from a car in motion, which ran over him with one wheel. When seen the dog was evidently in acute pain, and difficult to handle, great tenderness being manifested on manipulation of the posterior ribs. There was no external injury to assist in the diagnosis. Anodyne liniment was applied, and internal sedatives given, but the dog died during the night. The *post mortem* showed a rupture of the capsule of the spleen and an exudation of the contents into the abdominal cavity, the border of the interior right lobe of the liver was split in seven places, and the duodenum almost completely severed by the crushing action between the tyre and possibly some rib-like elevation in the road.

III. A collie dog was completely run over by a chassis, and in the rolling process both testicles and scrotum were nearly torn away, and damage to some surrounding tissues necessitated removal of the former. No complications ensued, and recovery rapidly took place. I mention this case, which may seem a somewhat trivial one on the face of it, because of the frequency with which this class of injury is inflicted by motor cars, and I attribute it to the fact that during the rolling over which takes place underneath the car, the testicles, being pendulous, are liable to come into contact with projecting metal parts, and become badly torn or completely removed by being hooked up in some way.

IV. A Dalmatian bitch, which was run over by one wheel, showed no definite symptoms for twelve hours, when she began to look distressed, and breathing became accelerated. No urine having been passed during the night, a catheter was used without success. Great pain was evident in the perineal region, which hot fomentations seemed to increase, and death took place twenty-four hours after the accident. The *post mortem* revealed a ruptured bladder and peritonitis. I blame myself for not operating in this instance, as I was firmly convinced at the twelfth hour that such a possibility might exist, but the owner was averse to operation, and I was unable to convince her of the evident necessity. I should not hesitate, however, when permission can be obtained, to open the abdominal cavity when-

ever internal injuries or organic ruptures can be diagnosed, as my next case will substantiate.

V. A fox terrier bitch, 10 years old, after an accident in the street, was seen in a collapsed condition, and evidently bleeding profusely internally. There was no relief from the treatment adopted, and it was decided to operate the same night. Rupture of the right kidney was found, and on this being ligatured and removed, the hæmorrhage ceased. The abdominal cavity was washed out with a normal antiseptic solution and mopped dry with sterilized gauze and wool. The wound was closed in two layers by gut and silk, and there was a complete recovery in a few days.

VI. A retriever dog was brought in with prolapse of the bowel and external wounds in the thigh and inguinal region after an accident with a motor cycle. The operation of protopexia, or ventrifixation of the bowel to the abdominal wall was performed with good result.

VII. A young terrier dog was injured in the lumbar region and kidneys by a car. It died an hour after being seen, and the *post mortem* showed a rupture of the kidney and a fracture of the spine.

VIII. A cross-bred collie bitch had both fore legs fractured by a motor-bicycle collision, they were set and a recovery took place.

IX. A terrier dog sustained an injury to the neck by a wheel passing over it. It was brought in unconscious, the eyeballs were rotating, and it was involuntarily passing urine. It remained in a comatose state for twenty-four hours and then died. The *post mortem* showed dislocation of the occipito-atloid articulation, the spinal cord was almost severed, but all the other organs were normal.

X. A dog was injured by a collision with a motor bicycle, the rider of which was of opinion that the dog got his leg through the spokes in some way, with the result that the gastrocnemius tendon was completely divided in the near hind leg. Suture of the divided tendon was made under an anæsthetic, silkworm gut being used to make the union, the wound in this case being dressed with chloroform and iodine 1 per cent., and the leg encased in normal position by plaster of Paris bandages. These remained on for three weeks, and on being removed the

tendon had resumed its proper function, and lameness cannot now be detected in the limb.

XI. Partial and complete rupture of the stomach are not frequent sequels to motor accidents in my experience, but one case is worth recording in which laparotomy was performed, and a necrosed partially ruptured portion of the stomach wall was excised and the patient is still alive, apparently healthy, and free from gastric trouble.

XII. Stricture of the bowel was caused in a spaniel bitch by a motor accident, eighteen months previous to my treating her for complete stoppage and intestinal paralysis. I attempted to evacuate the bowel with glycerine suppositories, by enemas, and by a long bone spoon which I employ for this purpose, but without successful result in this instance. Laparotomy was performed under an anæsthetic, and an attempt was made to knead the obstruction down the bowel towards the rectum. This also failed, and the constricted portion of the bowel and also the obstruction were removed. The divided parts were brought together by a Murphy button, which remained in position so long that a secondary operation had to be performed to remove it from a mass of granulations and anastomosed tissue. The opposing sections of the bowel were again brought together over a tube of carrot, and this supported the united action for several days when it was passed in a partially digested condition and covered with mucus. Benger's food was given for a fortnight afterwards, and the dog recovered and is still alive.

DEFORMITY OF THE EYE IN A CALF.

By Dr. WEBER,
Hamburg.

A THREE-MONTHS-OLD well-grown calf of the East Frisian breed came to the Hamburg slaughterhouse to be killed. It had two eyes in the right orbital cavity.

The bulbus at the inner angle of the eye was about three-fourths, and the one at the outer angle about half as large as the normal left bulbus. Whether the animal had a double or divided right nervous opticus I could not establish, as no part of the head came to hand. On the right side of the head there were two horns. The living animal appeared to see with both right eyes.

(*Berliner Tierärzt Woch.*)

PARASITIC MANGE ORDER OF 1911.

THE Board of Agriculture and Fisheries, by virtue and in exercise of the powers vested in them under the Diseases of Animals Acts, 1894 to 1911, and of every other power enabling them in this behalf, do order, and it is hereby ordered, as follows:—

Definition of Parasitic Mange.

1.—The expression "parasitic mange" in this Order means sarcoptic mange or psoroptic mange in a horse, ass or mule.

Separation of Diseased and Suspected Animals and Notice of Disease.

2.—(1) Every person having in his possession or under his charge a horse, ass or mule affected with or suspected of parasitic mange shall (*a*) as far as practicable keep that animal separate from horses, asses and mules not so affected or suspected; and (*b*) with all practicable speed give notice of the fact of the horse, ass or mule being so affected or suspected to a constable of the police force for the area wherein the horse, ass or mule so affected or suspected is, who shall forthwith give information of the receipt of the notice to an Inspector of the Local Authority.

(2) In the administrative county of London (including the city of London) the notice may be given to an Inspector of the Local Authority.

(3) An Inspector of the Local Authority who receives information of the existence or supposed existence of parasitic mange shall forthwith report the fact to the Local Authority.

Notification of Disease by Veterinary Surgeons.

3. The Animals (Notification of Disease) Order of 1910 shall be read and have effect as if parasitic mange were included in the list of diseases to which that Order applies, and as if notice of the existence or suspected existence of parasitic mange were required by that Order to be given by a Veterinary Surgeon or Veterinary Practitioner to an Inspector of the Local Authority.

Veterinary Inquiry by Local Authority as to existence of Parasitic Mange.

4.—(1) The Local Authority on receiving information of the existence, or supposed existence, of parasitic mange shall forthwith cause inquiry to be instituted as to the correctness of such information with the assistance and advice of a Veterinary Inspector, or of a veterinary practitioner qualified according to the Act of 1894 to be a Veterinary Inspector.

(2) The owner and occupier of any premises on which there is a horse, ass or mule affected with, or suspected of, parasitic mange, shall give all reasonable facilities for the inquiry by the Local Authority under this Article.

Detention and Treatment of Animals.

5.—(1) A Veterinary Inspector of the Local Authority may serve a Notice (in the Form A* set forth in the Schedule to this Order, or to the like effect) on the occupier of any stable, shed, field or other premises in which there is a horse, ass or mule which in his opinion is affected with parasitic mange, and thereupon the following restrictions shall take effect:—

(i) The horse, ass or mule so affected shall not be moved out of the stable, shed, field or other premises specified in the Notice, except with the written authority, and under the supervision, of an Inspector of the Local Authority, and only to some other place of detention or to a knacker's yard; and during the detention it shall from time to time, as often as may be necessary, be treated by the owner thereof with some dressing or other remedy for parasitic mange approved for that purpose by a Veterinary Inspector of the Local Authority or a Veterinary Surgeon or Veterinary Practitioner employed by the owner of the animal to examine it;

(ii) No other horse, ass or mule shall be moved out of the stable, shed, field or other premises unless on each occasion immediately before the movement it is treated with some dressing or other remedy for parasitic mange approved for that purpose by a Veterinary Inspector of the Local Authority or a Veterinary Surgeon or Veterinary Practitioner employed by the owner of the animal to examine it.

(iii) No horse, ass or mule shall be allowed by the owner or person in charge thereof to stray out of the stable, shed, field, or other premises.

(2) A Notice under this Order shall remain in force until it is withdrawn by a Notice in writing served on the occupier of the premises by an Inspector of the Local Authority.

(3) Where a Notice refers to two or more diseased animals the Notice may subsequently be altered so as to refer to one or more of such animals only.

(4) An Inspector shall with all practicable speed send a copy of any Notice served under this Article to the Local Authority and to the police officer in charge of the nearest police station of the district.

Cleansing and Disinfection.

6.—(1) Any place in which a horse, ass or mule affected with, or suspected of, parasitic mange has been kept shall, if and when so required by an Inspector of the Local Authority, be cleansed and disinfected by, and at the expense of, the occupier of such place as follows:—

(*a*) The place shall be swept out, and the sweepings shall forthwith be well mixed with quicklime and be effectually removed from contact with horses, asses or mules; and

(*b*) The floor of the place and all other parts thereof with

* Not reprinted.

which such horse, ass or mule has come in contact shall be thoroughly washed, or scrubbed, or scoured with water; then

(*c*) The same parts of the place shall, so far as is practicable, be disinfected in accordance with the subsequent provisions of this Article.

(*d*) In the case of a field or other place which is not capable of being so cleansed and disinfected, it shall be sufficient if such field or place be cleansed and disinfected as far as practicable and to the satisfaction of an Inspector of the Local Authority.

(2) Every utensil, manger, feeding-trough, pen, hurdle, harness, clothing, or other thing used for or about a horse, ass or mule affected with, or suspected of, parasitic mange shall, as soon as practicable after being so used, and before being used for any other horse, ass or mule, be cleansed by being thoroughly washed, or scrubbed, or scoured with water, and subsequently disinfected in accordance with the subsequent provisions of this Article, and such cleansing and disinfection shall be carried out by, and at the expense of, the owner of the thing.

(3) Every place or thing, or part thereof, required by this Article to be disinfected shall be thoroughly coated or washed with:—

(*a*) A 1 per cent. (minimum) solution of chloride of lime containing not less than 30 per cent. of available chlorine; or

(*b*) A 4 per cent. (minimum) solution of carbolic acid (containing not less than 95 per cent. of actual carbolic acid), followed by a thorough sprinkling with limewash; or

(*c*) A disinfectant equal in disinfective efficiency to the above-mentioned solution of carbolic acid, followed by a thorough sprinkling with limewash.

(4) If any person fail to cleanse and disinfect any place or any utensil, manger, feeding-trough, pen, hurdle, harness, clothing, or other thing, or to remove any litter, in accordance with this Order, it shall be lawful for the Local Authority, without prejudice to the recovery of any penalty for the infringement of this Order, to cause such place or such utensil, manger, feeding-trough, pen, hurdle, harness, clothing, or other thing to be cleansed and disinfected, or to remove such litter, and to recover summarily from such person the expenses thereby incurred.

(5) Where the power conferred by the preceding provision of this Article is exercised by the Local Authority, the occupier of the place, and the owner of the thing, to be cleansed and disinfected shall give all reasonable facilities for that purpose.

Prohibition to Expose or Move Animals Affected with Parasitic Mange.

7.—(1) It shall not be lawful for any person:—

(i) To expose a horse, ass or mule affected with parasitic mange in a market, fair, sale-yard, or other public or private place where such animals are commonly exposed for sale;

(ii) To place a horse, ass or mule affected with parasitic

mange in a lair or other place adjacent to or connected with a market, fair, or sale-yard, or where such animals are commonly placed before exposure for sale;

(iii) To send or carry, or cause to be sent or carried, a horse, ass or mule affected with parasitic mange on a railway, canal, river, or inland navigation, or in a coasting vessel;

(iv) To carry, lead, or drive, or cause to be carried, led or driven, a horse, ass or mule affected with parasitic mange on a highway or thoroughfare, except with the written authority of an Inspector of a Local Authority;

(v) To place or keep a horse, ass or mule affected with parasitic mange on common or uninclosed land, or in a field or place insufficiently fenced, or in a field adjoining a highway unless that field is so fenced or situate that any horse, ass or mule therein cannot in any manner come in contact with any horse, ass or mule passing along that highway or grazing on the sides thereof;

(vi) To graze a horse, ass or mule affected with parasitic mange on pasture being on the sides of a highway; or

(vii) Being the owner or person in charge of a horse, ass or mule affected with parasitic mange, to allow it to stray on a highway or thoroughfare or on the sides thereof, or on common or uninclosed land, or in a field or place insufficiently fenced.

(2) Where a horse, ass or mule exposed or otherwise dealt with in contravention of this Article, an Inspector of the Local Authority or other officer appointed by them in that behalf may seize it and remove it, or cause it to be removed, to some convenient and isolated place, to be there isolated and treated by the Local Authority in accordance with the provisions of this Order; or, on the application of the owner or person in charge of the animal, the Inspector or officer may authorize its removal with a view to its detention and treatment, and the removal of the animal by or under the authority of the Inspector or officer shall not constitute a contravention of this Article.

(3) The Local Authority may recover the expenses of the execution by them or by their Inspector or other officer of the provisions of this Article from the owner of the horse, ass or mule seized.

Weekly Returns as to Disease.

(8) When, as the result of the veterinary inquiry prescribed by Article 4 of this Order, parasitic mange is found to exist, the Local Authority of the District shall cause a return thereof to be made forthwith to the Board, on a form provided by the Board, with all particulars therein required, and shall continue so as to cause a return thereof to be made on the Saturday of every week until all the diseased animals have been accounted for as killed, died or recovered.

Extension of certain Sections of Diseases of Animals Act, 1894.

(9) Horses, asses and mules shall be animals, and parasitic

mange of horses, asses and mules (in this Order called parasitic mange) shall be a disease for the purposes of this Order and of the following sections of the Act of 1894, namely:—

Section forty-three (*Police*);

Section forty-four (*General Administrative Provisions*);

and also for the purposes of all other sections of the said Act containing provisions relative to or consequent on the provisions of those sections and this Order, including such sections as relate to offences and legal proceedings.

Exemption of Army Veterinary Service and Veterinary Colleges.

(10) Nothing in this Order applies to horses, asses or mules which are the property of the Crown, or are in stables of military barracks or camps and under the care and supervision of the Army Veterinary Service, or to horses, asses or mules in stables of any Veterinary College affiliated to the Royal College of Veterinary Surgeons.

Offences.

11.—(1) If a horse, ass or mule is moved in contravention of the restrictions imposed by any Notice under this Order, the owner of the animal and the person for the time being in charge thereof, and the person causing, directing, or permitting the movement, and the consignee or other person receiving or keeping it knowing it to have been moved in contravention as aforesaid, and the occupier of the place from which the animal is moved, shall, each according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894.

(2) If any person, without lawful authority or excuse, proof whereof shall lie on him:—

(i) Does anything in contravention of this Order; or

(ii) Where required by this Order to keep an animal separate as far as practicable, or to give notice of disease with all practicable speed, fails to do so; or

(iii) Fails to do anything which by this Order he is required to do;

he shall, according to and in respect of his own acts and defaults, be deemed guilty of an offence against the Act of 1894.

Interpretation.

(12) In this Order:—

"The Board" means the Board of Agriculture and Fisheries;

"Inspector" includes Veterinary Inspector;

"The Act of 1894" means the Diseases of Animals Act, 1894.

Other terms have the same meaning as in the Act of 1894.

Revocation.

13.—(1) Any Order of the Board relating to parasitic mange of horses, asses or mules, in force at the date of commencement

of this Order, shall thereupon be revoked, and any Regulation made by a Local Authority under such revoked Order shall thereupon cease to operate.

(2) Nothing in this Article shall affect the operation of a Notice served under any Order hereby revoked, or the power to withdraw such Notice.

Extent.

(14) This Order extends to England and Wales and Scotland.

Commencement.

(15) This Order shall come into operation on the first day of January, nineteen hundred and twelve.

Short Title.

(16) This Order may be cited as the PARASITIC MANGE ORDER OF 1911.

In witness whereof the Board of Agriculture and Fisheries have hereunto set their Official Seal this twenty-second day of November, nineteen hundred and eleven.

L. S.

T. H. ELLIOTT,
Secretary.

Abstract and Report.

TRYPANOSOME DISEASES OF DOMESTIC ANIMALS IN UGANDA*

II.—TRYPANOSOMA BRUCEI (PLIMMER AND BRADFORD).

BY COLONEL SIR DAVID BRUCE, C.B., F.R.S.; CAPTAINS A. E. HAMERTON, D.S.O., AND H. R. BATEMAN, R.A.M.C.; and CAPTAIN F. P. MACKIE, I.M.S.

INTRODUCTION.

Indexed B. A. I.

THIS species was only met with on one occasion during the work of the Commission in 1909. This was in the blood of an ox from the Mabira Rubber Estate (latitude 0° 30′ N., longitude 32° 55′ E.). The manager wrote that the animal came from the Bukedi District, about 100 miles to the north (latitude 1° 50′ N., longtitude 32° 40′ E.). Not much is known of this district, as it has only recently come under administration, and therefore it is impossible to say whether the ox was infected in Bukedi or on the journey south.

This is the species of trypanosome which was first discovered by Bruce, in 1894, in Zululand, to be the cause of nagana or tsetse-fly disease. During the work of the Sleeping Sickness

* Reprinted from the *Proceedings of the Royal Society*, B, vol. lxxxiii.

Commission of the Royal Society in 1903, it was also met with in a herd of cattle from the same district of Bukedi, and then described as the "Jinja trypanosome."* It is impossible to name with any certainty the trypanosome seen in 1903, which affected the horses, camels and dogs of the Abyssinian Boundary Commission. This was described as the "Abyssinian trypanosome." Its morphology† shows it to be similar to *Trypanosoma brucei*, so that in all likelihood it was either this species or the closely related *T. evansi*. As camels were infected, it was more probably the latter.

In regard to the third kind of trypanosome seen in 1903, and referred to as the "Mule trypanosome," no opinion can, at present, be given.

As to the remaining trypanosome seen in 1903, and known as "Pordage's ox trypanosome,"‡ an examination of the old specimens at once disclosed its identity. It is *T. vivax* (Ziemann); and this accounts for the fact that the blood of the ox injected into a monkey and a dog had no effect, these animals being refractory to *T. vivax*.

Morphology of Trypanosoma brucei, Uganda, 1909.

This species is interesting on account of its well-marked dimorphism, in which *T. gambiense* resembles it. There are two varieties—the long and slender with free flagellum, and the short and stumpy without free flagellum. The shortest are only 13 and the longest 35 microns in length.

In this paper the long and slender are considered to be those which measure from 25 to 35 microns; the short and stumpy from 13 to 21 microns. Those trypanosomes which measure 22, 23 or 24 microns are called intermediate. The general character of these forms may be given, shortly, as follows: The long and slender have a narrow extended posterior extremity, an elongated oval nucleus, a well-developed undulating membrane thrown into many waves, folds or plications, and a long free flagellum. The short and stumpy, on the other hand, have a rounded posterior extremity somewhat like the head of a turtle, a round or oval nucleus lying transversely to the long axis of the trypanosome, a well-developed undulating membrane thrown into bold folds, and no free flagellum. The intermediate have a short free flagellum, a posterior extremity resembling that of the short and stumpy form but narrower, an oval nucleus, and a well-developed undulating membrane.

A. *Living, Unstained.*

No observations were made in Uganda on this species of trypanosome in the living, unstained condition.

* "Reports of the Sleeping Sickness Commission of the Royal Society," No. VI, p. 112.

† *Ibid.*, plate 2, p. 113.

‡ *Ibid.*, No. IV, p. 48.

B. *Fixed and Stained.*

The blood-films were fixed, stained, and measured as described in the *Proceedings.**

Length.—The following table gives the length of this species as found in Uganda, in the ox, monkey, dog, guinea-pig and rat. Only one trypanosome was found in the blood of the original Mabira ox. It measured 24 microns. In the monkey only eleven trypanosomes could be found. In all the others, twenty trypanosomes have been drawn and measured. These were taken as they came, except that dividing forms were passed by.

TABLE I.—MEASUREMENTS OF TRYPANOSOMA BRUCEI, UGANDA STRAIN, 1909.

Date	Number of experiment	Animal	Day of disease	Method of fixing and staining	In microns		
					Average length	Max. length	Min. length
1909 Aug. 12	1461	Ox... ...	Not known	Osmic acid and Giemsa	24.0	24.0	24.0
Sept. 30	1627	Monkey ...	26th	,, ,,	24.8	30.0	19.0
Aug. 26	1479	Dog ...	41st	,, ,,	26.5	32.0	22.0
,, 30	1479	,, ...	45th	,, ,,	22.0	29.0	16.0
Sept. 30	1479	,, ...	76th	,, ,,	23.5	34.0	20.0
Oct. 11	1644	Guinea-pig	33rd	,, ,,	20.7	34.0	15.0
,, 18	1644	,,	40th	,, ,,	27.1	34.0	17.0
Sept. 9	1482	Rat ...	5th	,, ,,	24.7	30.0	21.0
,, 13	1482	,, ...	9th	,, ,,	23.5	31.5	19.0
,, 16	1643	,, ...	8th	,, ,,	19.6	21.0	18.0
					23.6	34.0	15.0

It will be seen from the above table that *T. brucei*, Uganda strain, 1909, varies in length betwen 15 and 34 microns. Doubtless, individuals could be found slightly longer or shorter than this if they were hunted for. In Table I, as already mentioned. the twenty trypanosomes drawn are the first met with, except that dividing forms are left out, and this rule is adhered to throughout.

The average length of the 172 trypanosomes dealt with in Table I is 23.6 microns; but, as this does not give much information, the following table has been prepared. This represents by means of dots the length of each of 160 trypanosomes, in eight preparations of twenty each. Although *T. brucei* is described as a dimorphic species, it must not be supposed that there is any strict line of demarcation between the long and slender and short and stumpy forms. There are the intermediate forms. This table is also useful in showing at a glance the distribution of the various lengths.

This division of *T. brucei* into long, intermediate, and short forms is, of course, quite artificial, as the one form passes into the

* B, 1909, vol. lxxxi, pp. 16 and 17.

other by insensible gradations. It may, however, prove of some use in the identification of this species. In the same way a series of measurements of the various parts of the trypanosome body may also prove useful. The following table (of which we reproduce the summary only) gives the distance between the posterior extremity and the micronucleus, the micronucleus and the nucleus, the size of the nucleus, the distance between the nucleus and the anterior extremity, and the length of the free flagellum.

TABLE II.—MEASUREMENTS OF THE VARIOUS PARTS OF TRYPANOSOMA BRUCEI, UGANDA STRAIN, 1909.

Experiment	Posterior extremity to micronucleus	Micronucleus to nucleus	Nucleus	Nucleus to anterior extremity	Free flagellum	Total length
		Long and Slender Form.				
Average ...	2.1 ...	6.6 ...	3 ...	10.2 ...	6.4 ...	—
		Intermediate Forms.				
Average ...	1.4 ...	6 ...	2.9 ...	9.2 ...	3.5 ...	—
		Short and Stumpy Forms.				
Average ...	1.1 ...	4.9 ...	2.4 ...	10.7 ...	— ...	—
Average of three forms ...	1 5 ...	5.8 ...	2.8 ...	10 ...	3.3 ...	—

Breadth.—The long and slender forms average 1.5 microns; the short and stumpy 2.5 microns.

Shape.—As already mentioned, this is a markedly dimorphic species, composed of long, slender forms with free flagella, and short, stout forms without free flagella. It is curious that the long forms may preponderate in the blood one day and the short forms another. For example, as will be seen from Table I, the trypanosomes in the guinea-pig's blood on October 11 were mostly short forms, giving an average of 20.7 microns, while a week later they were mostly long forms, giving an average of 27.1 microns. Note also Rat 1643, with an average of 19.6 microns, and Rat 1482, with an average of 24.7 microns.

This species may be compared with Dutton and Todd's *T. **dimorphon***, and in truth the coloured drawings given by them in their original plate* (figs. VII, IX and X) are very similar, if not identical, in shape and size with *T. **brucei***. Fig. X, the long, slender form with free flagellum, is 30.5 microns in length. Fig. VII, the short, stumpy form without free flagellum, is 16 microns in length. As to fig. VI, on the same plate, stated to represent the "tadpole form," one would suspect from its general shape and appearance that it had no connection with the others. But in regard to figs. VII and X, anyone comparing Dutton and Todd's plate with the coloured plate in *Proceedings*, B, vol. lxxxiii, must be struck with the close resemblance between these two forms of *T. **dimorphon*** and *T. **brucei***. Is it possible that Dutton and Todd were dealing with *T. **brucei*** when they described *T. **dimorphon**?*

* "First Report of the Trypanosomiasis Expedition to Senegambia (1902)," University Press of Liverpool, 1903.

Contents of Cell.—The protoplasm which is stained a pale blue is often dotted over with chromatin granules, especially in the anterior half. In well-stained preparations the distribution and number of these granules is sufficient, according to McFadyean, to differentiate this species from *T. evansi*. This was also pointed out by Laveran and Mesnil some years ago, when they wrote: "Avec un peu d'habitude on arrive au contraire à distinguer les deux Trypanosomes, quand on dispose de préparations bien colorées et riches en parasites."*

Nucleus.—Is oval or elongated in shape in the long forms, a short oval in the intermediate, round or oval in the short, stumpy forms, and situated about the middle of the body.

Micronucleus.—Small and round, situated, on an average, 2.1 microns from the posterior extremity in the long and slender forms, 1.4 microns in the intermediate, and 1.1 microns in the short and stumpy.

Undulating Membrane.—This is well developed in this species and thrown into many folds and undulations. In this it differs markedly from *T. vivax*.

Flagellum.—The flagellum in the long and slender forms is free and, on an average, 6.4 microns in length. In the short and stumpy forms there is no free flagellum.

Comparison of T. brucei, Uganda, 1909, with T. brucei, Zululand, 1894.

When *T. brucei* was discovered in Zululand, in 1894, it was naturally thought to be the one and only trypanosome in Africa, and a detailed description seemed unnecessary. Now, however, since the number of species in Africa has increased to such an alarming extent, it is necessary to add to the old description by more detailed measurements. Luckily, many of the old Zululand preparations are still extant, so that it has been possible to do this. It must, however, be borne in mind that the Zululand preparations are some fifteen years old, and were stained with carbol-fuchsin, and not by Giemsa, as in the case of the Uganda strain. They may, therefore, have shrunk to a greater extent than the more recently stained specimens.

T. brucei, Zululand, 1894: The average length was 22.8 microns, the maximum length 35 microns, and the minimum length 13 microns.

The average length of the *T. brucei*, Uganda, 1909, was 23.6 microns, the maximum 34 microns, and the minimum 15 microns. The measurements of the two strains therefore correspond very closely.

Animals Susceptible to T. brucei.

The number of experiments carried out on the various animals is too small for comparative purposes, but sufficient to show that cattle and the smaller laboratory animals are susceptible to this trypanosome.

* "Trypanosomes et Trypanosomiasis," 1904.

One ox was naturally infected. As the result of experimental inoculation the following results were obtained:—One goat, negative; two monkeys, one positive, and one negative died 10 days after inoculation; one dog, positive; one rabbit, positive; three guinea pigs, two positive, and one still under observation 18 days negative; three rats, two positive, and one still under observation 18 days negative.

Cultivation of T. brucei, Uganda Strain, 1909.

No attempt was made in Uganda to cultivate this trypanosome.

Carrier of T. brucei.

No experiments were made in the laboratory at Mpumu with *Glossina palpalis* as a carrier of this trypanosome, and no evidence is to hand as to how it is conveyed from sick to healthy animals in the district of Bukedi.

Conclusion.

With the evidence available the Commission consider themselves justified in considering the trypanosome recovered from the Uganda ox to be identical with *T. brucei*, the cause of Nagana in Zululand and other parts of South Africa.

THE LADY TALBOT MILK INSTITUTE OF MELBOURNE, AUSTRALIA.

The third Annual Report of this Institute demonstrates that the good work inaugurated under the auspices of Lady Reginald Talbot in Victoria three years ago is being continued with most satisfactory results.

The function of the Institute, which is managed by an honorary Board of Management, composed of physicians, veterinarians, and laymen, is both charitable and educational. The principles aimed at by the Institute are:—

(*a*) The Education of mothers in the care and feeding of infants, special stress being laid on the necessity of breast feeding whenever possible.

(*b*) The absolute control of the milk, so that the article distributed should be free from contamination.

(*c*) The distribution of the milk, upon a charitable basis, but with discrimination and care, to infants of the poorer class, whose mothers are unable to feed their infants on the breast.

(*d*) The provision of a "guaranteed pure" supply, to be available for those willing to pay the extra cost of it.

(*e*) The improvement of farms and retail depôts from which the ordinary milk supply of the city is distributed.

The education of mothers is provided for by special nurses engaged by the Board. These nurses are solely engaged in

visiting the houses supplied by the Institute, advising and instructing the mothers in the care and feeding of the children.

The "guaranteed pure" supply means milk drawn from cows which successfully and periodically pass the tuberculin test, are frequently inspected by Government veterinarians, are constantly under the supervision of an inspector of the Agricultural Department, milked in premises thoroughly up-to-date and hygienic, immediately cooled to about 40° F., forthwith placed in sterilized bottles and retained at a low temperature until delivery, all of which conditions the contractor is bound to maintain under severe penalties.

That these conditions ensure a clean supply of milk is evident from the fact that no complaint of souring or uncleanliness of the milk has been received by the Secretary from the parents of the children supplied by the Institute.

Scientific tests have been conducted at the Melbourne University Research Institute by Mr. Norman Macdonald, B.V.Sc., Government Research Scholar, and by Dr. Rothera and Dr. Bull, of the Melbourne University, and these tests have shown the milk to be of a remarkably high quality and low bacterial contents. The milk is distributed by special agents appointed by the Board, and along with each daily supply the Institute provides the necessary quantity of ice to place in the small ice-chest also supplied to each home, so that the milk may keep sweet in the hottest weather till the next day's supply is received. It should be noted that no pasteurization or sterilization whatever is resorted to.

The price charged by the Institute is 1d., 2d. or 3d. per pint, according to the ability of the parents to pay. The ice-chest and daily supply of ice sufficient to last twenty-four hours are supplied free of charge. During the past summer the death-rate amongst "Talbot babies," as they are generally termed, was 4.86 per cent., an extremely small percentage, considering that a large number of the cases were weakly and many actually ill before coming under the Institute's care.

The Institute is supported by the Government, the municipalities, Charitable Trusts, and the public. The total cost per case last year was £2 4s. 1d., which includes loss on milk supply, secretarial, nursing, and other expenses, of which the report gives full details.

The milk, as in previous years, is machine-drawn, the summary of the bacteriological investigation being reprinted elsewhere. The report of the butter-fat tests shows an average of 4.45, the lowest being 3.8 and the highest 5.4 during the summer season.

The following extracts from the report of the Government Dairy Supervisor are of especial interest to veterinarians:—

The Herd.

The number of cows milked daily throughout the season averaged 95, chiefly of the Ayrshire type, all having undergone veterinary inspection and the tuberculin test at various times

since December 20, 1910. As a result of the veterinary inspections, five cows were rejected for tuberculosis, and nine cows were prohibited during the season by the dairy supervisor for mammitis of the udder; the balance of the herd were kept in good condition, well fed and groomed twice daily, stalled at nights, and during the day turned out into an area of about twenty acres leased in connection with the farm as a run and exercise ground for the cows. The cows were brought into the bails clean and in a condition satisfactory for the supply of pure milk of the standard required by Board of Management for the Institute.

Milking Methods.

The milking has been done throughout the season with three L.K.G. milking machines. Before the machines were applied the milk of each cow was carefully examined by the supervisor, a small quantity being drawn from each teat for the purpose, as a check against milk being used from injured udders, and also as a means of detecting the symptoms of any of the various diseases of the udder affecting the milk supply. These precautions were taken daily throughout the season. The fore milk—about four streams from each teat—was then taken and the teats and udders were carefully washed with warm water, clean water being used for each pair of cows. The machines were then applied, and after removal the cows were stripped out by hand into special buckets with cotton-wool strainers fitted into the mouth. The milk, after being weighed, was passed through a cleansing centrifuge and thence over the refrigerator, and the temperature reduced to 40° F., and immediately bottled, sealed and dated, and placed in crates, packed in ice, and delivered to the distributing agents within four hours after being milked, every precaution being taken during the whole process to ensure cleanliness. All utensils, milk bottles, and everything coming in contact with the milk was sterilized twice daily. All tea cups and rubberware in connection with the milking machines were boiled twice daily in soda water 10 per cent. strength and left in the sterile water between milkings and immediately before being used were blown out with dry steam. The machines were also sterilized at intervals during the milking operations by being placed in boiling water and soda after each machine had milked a pair of cows, opportunity being taken for this work in the interval during which the bails were hosed down and a fresh section of the herd brought in. The process of sterilizing the milking machines received special attention by the supervisor through the season. Four samples of milk were sent in daily to the University for bacteriological examination and testing for butter fat. For comparative results two cows were hand-milked throughout the season and a sample of the milk sent to the University as a test for purity against machine-drawn milk. For the hand-milking the cows were first brushed down the sides and flanks with a damp brush to prevent, as far as possible, dust and hairs falling into the milk; the udder and teats were

washed. As for the milking machine, the sample for testing was taken after passing through a clean strainer used, and the bottle containing the sample was cooled down at once to below 40° F. by being suspended in the brine tank, this not coming in contact in any way with the machine milk, an equal quantity being taken from each hand-milked cow. All the employees at the dairy were provided with a clean suit of overalls and cap for each milking, and received instructions from the supervisor throughout the season on sanitary methods in the production and handling of milk for infants, the same staff being employed right throughout the season.

Miscellaneous.

ROYAL COLLEGE OF VETERINARY SURGEONS.

Examinations in London.

The following gentlemen passed their Final Examination and were admitted Members of the Royal College of Veterinary Surgeons:—

Mr. C. Holland*
„ E. J. Lainé
„ C. W. Perrin
Mr. H. Stephenson
„ B. M. R. West

At a meeting of the Board of Examiners held in London on December 8, for the Written, and on December 15 for the Oral and Practical, Examinations, the following gentlemen passed their Third Examination.

Mr. S. E. Hill*
„ C. J. R. Lawrence
„ R. A. Murless
„ W. F. Poulton
„ A. A. Pryer*
Mr. W. E. Petty
„ E. M. Robinson*
„ S. L. Slocock
„ P. L. Thierry
„ G. M. Vincent

The following passed their Second Examination:—

Mr. A. H. Adams*
„ W. P. S. Edwards
„ J. M. Knighton
„ H. A. King
„ R. H. C. Lucas
„ G. F. Marais
Mr. B. J. W. Nicholas
„ R. J. Stow
„ R. H. Stalker
„ H. B. Williams
„ H. S. Wright

The following passed their First Examination:—

Mr. J. Daly*
„ E. W. Garry
„ W. Shipley
Mr. J. H. Stewart*
„ G. Simons*
„ K. S. Simpson

Examinations in Edinburgh.

At a meeting of the Board of Examiners held in Edinburgh on December 8 for the Written, and on December 13 for the

Marked thus * passed with Second-class Honours.

Oral and Practical, Examinations, the following gentlemen passed their Final Examinations and were admitted Members of the Royal College of Veterinary Surgeons:—

Mr. G. Currey
„ S. C. Currie
Mr. J. R. Greig
„ T. F. Sexton

The following passed their Third Examination:—

Mr. R. L. Armour
„ F. J. L. Croudace
„ A. Q. Hall
„ C. Nicholson
Mr. R. E. Drennan
„ S. E. Holmes
„ D. R. Williamson

The following passed their Second Examination:—

Mr. E. Sewell
„ J. W. Stanley
Mr. G. Williamson

The following passed their First Examination:—

Mr. W. J. Bainbridge*
„ P. McLaughlin*
„ T. M. Martin
Mr. L. Littler
„ D. S. Phorson
„ T. A. Shaw

EXAMINATIONS IN GLASGOW.

The following gentlemen passed their Final Examination and were admitted members of the Royal College of Veterinary Surgeons:—

Mr. J. Scott
Mr. J. Gibson

At a meeting of the Board of Examiners held in Glasgow on December 8 for the Written, and on December 13 for the Oral and Practical, Examinations, the following gentlemen passed their Third Examination:—

Mr. H. McD. Paul*
„ J. McI. Galloway
Mr. P. J. Turner
„ G. B. Cooper

The following passed their Second Examination:—

Mr. W. Barr
„ R. T. Smith
Mr. J. D. Fulton

EXAMINATIONS IN DUBLIN.

The following gentlemen passed their Final Examination and were admitted members of the Royal College of Veterinary Surgeons:—

Mr. F. J. Shearman
„ T. L. Shea
„ R. P. Byrne
„ R. Devereux
„ J. J. G. Keppel
„ J. T. Evans
Mr. R. Marner
„ W. J. O'Donoghue
„ A. O'Neill
„ P. W. D. O'Connell
„ W. E. Phipps
„ V. Fox

The following passed their Third Examination:—

Mr. M. McClancy
„ J. J. O'Neill
„ W. P. Walsh
Mr. F. J. Carroll
„ T. F. Quirke*
„ P. J. Sheil

Marked thus * passed with Second-class Honours.

The following passed their Second Examination:—

Mr. L. A. Herbert
„ P. D. Huston
„ St. J. C. P. McFarlan
„ J. Shannon
Mr. J. Campbell
„ S. O'Donel
„ M. H. Reid

The following passed their First Examination:—

Mr. A. J. W. L. Birchall
„ T. J. McDonald
„ G. McElligott
„ T. O'Connor*
Mr. J. P. Fahy
„ M. J. McGing
„ M. A. Murphy
„ W. J. Ward

EXAMINATIONS IN LIVERPOOL.

At a meeting of the Board of Examiners held in Liverpool on December 8 for the Written, and on December 14 and 18 for the Oral and Practical, Examinations, the following gentlemen passed their Final Examination:—

Mr. H. D. Lewis
Mr. E. L. Butters

The following passed their Third Examination:—

Mr. A. D. Morgan
„ W. Atkinson
Mr. V. A. Bartrum*
„ J. L. Williams

The following gentleman passed his Second Examination:—

Mr. M. W. Holland

The following passed their First Examination:—

Mr. S. S. Herbert
Mr. B. Whittam

Marked thus * passed with Second-class Honours.

Translation.

THE BACILLUS OF FOOT-AND-MOUTH DISEASE FOUND.

Indexed B. A. I.

THE annual meeting of Prussian Veterinary Surgeons was held yesterday in the Institute of the Teachers' Union, at Alexander Place, Breslau. Several representatives of the Minister of the Interior had been prevailed upon to attend, and in the interesting day's agenda the subject of most importance was centred on the question: "What has the last outbreak of foot-and-mouth disease taught us?" For one and a half years the Prussian Monarchy has been persistently and severely affected with this plague, which, in spite of all work and care taken against it, has remained constantly prevalent. Up to this moment no trace of the bacillus of this disease had come to hand, and all effort at attacking the real cause of the plague was wanting. Under these circumstances the announcement by the reporters that Dr. Siegel, one of the guests present, after indefatigable and painstaking researches, actually appeared to have found the bacillus of the disease, and that he would

impart the result of his investigations to the assembly, caused a great sensation. Dr. Siegel was listened to with intense interest as he unfolded the line of thought which he adopted in seeking out the bacillus of the disease, a work which had been broken off at different times, partly on account of external reasons and partly because he appeared to be on a false path, although he always resumed his investigations. He has now succeeded in discovering a micro-organism to which he has given the name of *Cytorrhyctes*, and which is looked upon as being beyond all doubt the bacillus of the disease. The investigator has announced no illusion, for the coccus found by him has been subjected to all the proofs which the fundamental law of Koch with its postulates deems necessary. Undoubtedly the coccus has passed all tests, for it may at once be demonstrated in the blood as well as always in the characteristic vesicles on the gums of animals ill of the disease; it can also be grown as a pure culture and—the most important postulate—by inoculation with a pure culture foot-and-mouth disease can be produced. The investigator has further found that artificially produced foot-and-mouth disease confers immunity against natural infection, although not yet absolute. To all appearance we stand on the threshold of a powerful revolution in the scientific combating of this disease, against which we have been more or less powerless up to now. The speaker demonstrated his address by excellent and instructive cinematograph pictures, and the great applause which greeted them showed their excellence and the value and present success of the work.

(*Berliner Morgenpost, Sunday, November 26*, 1911.)

[We commented on this announcement editorially in our issue of December, 1911, suggesting reserve in the acceptation of the claim pending further information as to Dr. Siegel's experiments. At present we maintain the same attitude.—EDS., *V. J.*]

Letters and Communications, &c.

Professor Gofton; Major Bishop, R.A.; Mr. Chambers; Professor O'Connor; Mr. Townsend; Mr. Mayall; Mr. F. Bullock; Dr. Rutherford; Board of Agriculture and Fisheries; Department of Agriculture and Technical Instruction for Ireland.

Books and Periodicals, &c., Received.

Bulletin of the Bureau of Sleeping Sickness; Report of the Director-General of the A.V.C.; Report of the Civil Veterinary Department of the Central Provinces; Agricultural Journal for Rhodesia; Agricultural Journal for Union of South Africa; Mr. Merck's Annual Report; London University Gazette; Fleming's "Obstetrics," revised and re-written by J. F. Craig, M.A., M.R.C.V.S. (Baillière, Tindall and Cox, London).

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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